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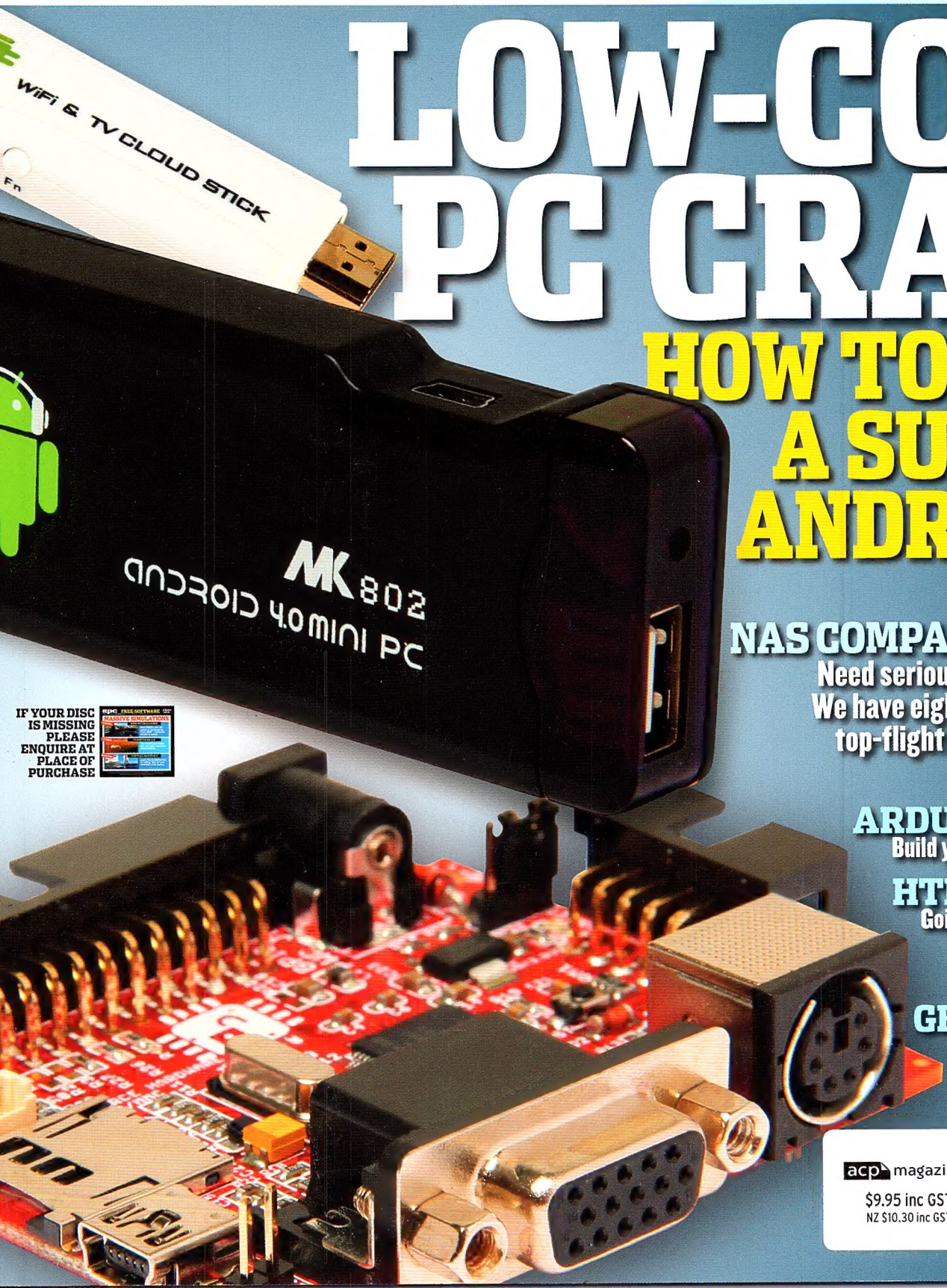

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03 editorial

TONY SARNO

I'm also the first to say that I love Windows RT on tablets.

I was surprised that *APC*'s coverage of Windows 8 was panned by several Microsoft supporters on social media who took offence that we weren't smitten with Windows 8 on the desktop. Firstly, *APC* isn't here to help Microsoft with its marketing, but to tell it as we see it. Secondly, we think Windows 8 is brilliant on the platforms it was created for: tablets and hybrids. Yes, *APC* staff thinks Windows 8 is the best operating system for tablets you can buy today, but somehow that tends to get lost once the Microsoft spruikers get on social media and castigate *APC* for knocking Windows 8 on the desktop.

As we mention in our coverage of the launch in this issue, nothing we've seen so far has changed our minds about Windows 8 on a desktop PC without a multitouch-enabled display. It's just plain awful to use. But I'm also the first to say that I love Windows RT on tablets, to the point where deputy editor Dan Gardiner (who also directly heads up the labs testing) felt he had to tone down one of my particularly enthusiastic assessments of Windows RT before it was published, in case I came across as a zealous fanboy.

I was smitten by RT because it lets me run the tools by which I run my life and this magazine, such as Word, Excel and PowerPoint, natively on an affordable tablet. In other words, I no longer need a stupidly large, battery-sucking overkill of a laptop to do it. I still need a serious PC, such as the DIY desktop beast that sits on my desk, but for video editing and playing games (for work purposes, you understand).

Perhaps the only other disappointment about Windows 8 is the Windows Store. Surely after a year of releasing the first Windows 8 previews, Microsoft could have done a better job populating it. It's been described by some critics as a wasteland and it's hard to disagree. Right now it's a complete struggle to find anything in it worth installing, let alone the fundamental applications that any platform needs. At the time of writing it didn't even have a native Facebook app. But maybe I'm being harsh here; let's revisit this conversation in six months, when the store should be much better stocked.

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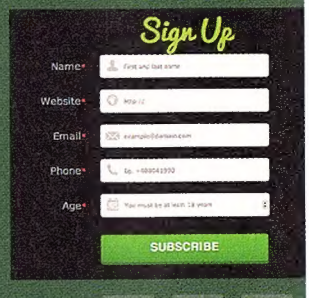

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FEATURE

MICROSOFT'S TABLETS SURFACE

APC's Dan Gardiner finally got his hands on a Microsoft Surface tablet at the Australian Windows 8 launch. Here are his impressions.

In the flesh, the Microsoft Surface RT tablet was more impressive than I expected. The build quality was reassuringly robust and · from an admittedly subjective angle, there's a definite 'we mean business' feel to the device.

It's the first of two Microsoft-designed Windows 8 tablets to be released (a Windows 8 Pro version is due in the next few months), these RT tablets start at $559 and are Microsoft's leaner, lighter and cheaper offerings.

They're based on the same Nvidia Tegra 3 ARM hardware that's found in many Android tablets and run a cut-back version of Windows 8 that can only run apps downloaded from the Windows Store.

From the square edges to the dark grey chassis, to the fuzzy cashmere-like backs of the Type and Touch Covers, it'd look completely at home in a classy corporate lounge (with perhaps a glass of whisky on the side). This is a device that, visually at least, should please Microsoft's business customers as much as the public at large.

Despite a comparatively lower 1,366 x 768 screen resolution, the 10.6in display was sharp and clean, and didn't appear overly blocky or jagged in use. Easy access to a microHDMI port and USB 2.0 socket should make plugging things in easy, and the interface was snappy with apps and games loading reasonably quickly.

As previously announced, you've got a choice of two official keyboard add-ons for Surface RT: the Touch Cover and Type Cover. I got to try attaching and typing on both.

With the former, you can sort of swing the magnetic mating points together and they'll snap together effortlessly. They're surprisingly secure, with enough strength to support dangling the 680g tablet from the keyboard. The Touch Cover is the slimmer option at 3mm thick, with pressure-based keys that lack mechanical parts.

The Type Cover is the more traditional mechanical type – it's essentially a notebook keyboard mated with a Smart Cover – and adds 2mm to overall thickness. Both are reasonably pleasant to type on and the Touch Cover has a subtle difference in texture between the keys and the spacing in between, meaning you can find the edges of keys with some practise.

For me, though, the extra $10 in price ($150 compared to $140) and couple of millimetres in thickness of the Type Cover are reasonable trade-offs for the potential boost in typing accuracy, but then, I spend a lot of my time staring torturedly at text editors.

What I wasn't quite as impressed with was the vertical narrowness of the trackpad – when scrolling in web pages or longer documents, it really was easier to reach out and use the touchscreen to move up and down.

Despite Windows RT being a little simpler than its x86 cousin, there are still areas that are a little confusing. It's slightly incongruous that Office 2013 RT runs in a faux Windows desktop environment, for example.

And in fact, Word, Excel and PowerPoint are probably the least Metro-fied (or 'modernised', in Microsoft's vernacular) apps you'll get on a Surface RT tablet – at the Preview stage we used them on, they're slightly tweaked rather than completely reworked reboots.

Obviously, with just a short period of test time I wasn't able to gauge things like battery life or the quality of internal components like speakers and cameras. We'll cover these in more detail when we get a review unit.

One thing at least was abundantly clear, though, even after such a brief look: running on a proper touchscreen device, Windows 8's interface changes make a lot more sense – and just work better outright – than on a touchless desktop or laptop. If you're getting a Windows 8 device, I'd make sure it has touch.

WINDOWS 8'S INTERFACE
MAKES A LOT MORE SENSE RUNNING ON A TOUCHSCREEN DEVICE
DISAPPOINTING
VERTICAL HEIGHT OF THE TRACKPAD

You get a choice of two covers: the Touch Cover and the Type Cover. We prefer the latter.

The Surface RT offers easy access to ports – microHDMI and USB 2.0.

The Windows 8 Q&A

Windows 8's impact promises to be huge but there's also some confusion about what it all means, so we try and clear some of it up with this FAQ.

It's hard to avoid the conclusion that Microsoft has taken computing to a new level with Windows 8, creating an operating system that lets a new class of hybrid mobile devices perform both tablet and PC functions. With Windows 8 or its RT variant inside it, a tablet or hybrid will let you run Excel or PowerPoint in native mode for the first time – something you could only do previously on a PC. But Windows 8's strength on mobile devices is probably its biggest weakness when it comes to what's now suddenly become legacy hardware: the humble desktop PC without a touch-enabled monitor. How usable is the tablet-oriented UI on a standard PC? And what about the Windows RT ARM-based version? Can it run x86 Windows apps? There are many questions surrounding this OS, so we've prepared this Q&A to clear up some of the issues.

Q Can you take me again through the different versions of Windows 8?

A The latest Windows range (confusingly, often colloquially referred to as 'Windows 8') comes in four different versions: Windows 8, Windows 8 Pro, Windows RT and Windows 8 Enterprise. If you're interested in Windows as a consumer, you only really need to be aware of the first three.

Windows 8 is the mainstream version, while Windows 8 Pro comes with additional features that makes it ideal for business and tech enthusiasts, such as Group Policy, BitLocker (and BitLocker To Go), Encrypting File System, Domain Join, Client Hyper-V and Remote Desktop (host).

There isn't really a 'main' version of Windows 8 available, but if there were one it would be Windows 8 Pro. Why? Because it's the most accessible full-featured version intended for consumers and regular PCs – easily available via a number of different purchase/upgrade methods – and it's the only version of the new Windows that's available off the shelf (ie. in a box or download package containing just the software). You can buy it standalone for $69.99 at retailers, for $39.99 as an upgrade from Windows XP/Vista/7 (until the end of January 2013) or for just $14.99 as an upgrade from any Windows 7 PC purchased between June 2, 2012, and January 31, 2013. By contrast, Windows 8 is only available as a preinstalled build on PCs and tablets, and Windows 8 Enterprise is, as its name suggests, just for enterprise users.

Then there's Windows RT, which also only comes preinstalled on tablets and hybrids, and can't be bought separately. It's a version of Windows created for the ARM processor architecture that powers most of the mobile devices in the market today. Windows RT won't run your current or legacy x86 Windows software – only apps downloaded from Microsoft's new app store, the Windows Store, and a version of Office ported to the ARM architecture.

Q What will Windows 8 do for my current PC?

A Windows 8 is an OS that's been redesigned and optimised for touchscreen devices. So if you have a PC without a touch-enabled monitor (isn't that 95% of users?) or a trackpad with Windows 8 drivers, you won't get any of the touch-based navigation benefits. However, there's more to Windows 8 on a PC than its Modern UI. While we're in the process of scientifically benchmarking Windows 8 against Windows 7 (see our January 2013 issue) our earlier testing of PCs using preview versions of Windows indicates that you get noticeably faster boot times, while the OS's memory footprint is smaller. As for claims that it offers better battery life on laptops, we're testing that. Also be aware that Microsoft has stopped paying for DVD licensing, so Windows 8 won't play your DVDs. You'll have to get separate software for that. And if you want Windows Media Center, you now need to pay for it separately.

Q So what kind of hardware do I need to get the best out of Windows for my PC or laptop?

A You need to get a multitouch monitor for your standard desktop PC, or a multitouch-enabled all-in-one or a tablet hybrid. A trackpad with Windows 8 drivers can make using the new UI easier, but our recommendation is that

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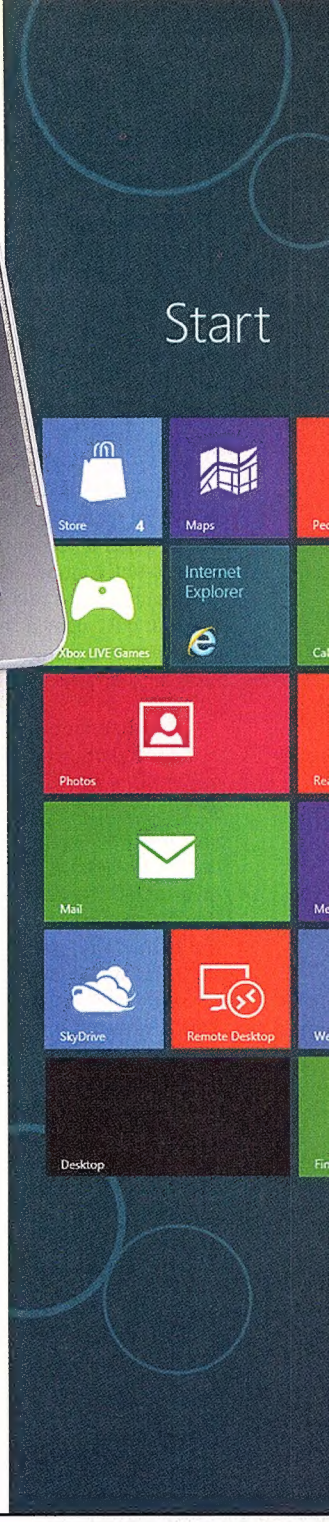

if you want to upgrade to Windows 8, make sure you upgrade the hardware. Nonetheless, Windows 8 will soon become the default OS shipping on all new mainstream desktop and laptop PCs everywhere, not to mention other Windows RT tablets. At the Windows 8 launch, Microsoft was showing off a range of some 40 Windows 8 devices available today from the likes of Acer, ASUS, Dell, HP, Samsung, Sony, Toshiba, Lenovo and Fujitsu, and with 200 devices in total planned for the Australian market at this point, you basically won't be able to escape Windows 8... unless you buy a Mac.

Q Is the Modern UI interface that bad on a PC?

A *APC* and its sister magazine, *TechLife*, have made a big deal of the fact that Windows 8's Modern UI doesn't work elegantly on a desktop PC (or laptop) and nothing we've seen since the launch has changed our minds. The Modern UI is designed to be driven by touch and gesture navigation on a small multitouch screen and simply doesn't translate well onto a desktop PC. Even if you have a multitouch monitor on your PC, you may soon tire of constantly holding your arms out to finger the screen.

On tablets or hybrid tablet/laptops, though, the Modern UI is a gem. Here, it definitely becomes the most advanced touch interface, smooth and able to be operated entirely with touches and swipes, bringing tears to the eyes of some of us who still mourn the passing of webOS. On tablets, Windows 8 makes iOS (in which you have to hunt down and press buttons both in the software and hardware to move back and forth to do things) look obsolete, and presents a much more consistent and natural touch interface than that of the patchy Android UI.

Its Live Tiles concept turns your home screen into a dynamic bunch of little shop windows that tell you what's going on inside each app. iOS and Android's static icons look old by comparison and most widgets look kludgy compared to the Live Tiles.

One final point, though: despite the Modern UI, you can still have the familiar Windows 7 desktop interface on your PC or laptop if you switch to the desktop view, which now comes packaged as an app in Windows 8. This takes you back to the familiar Windows 7 interface, although it's not a clear separation, as some apps can throw you back into the Modern UI when you least expect it.

Q Alright, I'm going to buy Windows on a tablet. What's the difference between Windows RT and Windows 8/Pro?

A Windows RT is the version of Windows 8 designed to run on tablets powered by ARM processors, which are used in the majority of tablets today. It's primarily intended to

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give Windows a foothold in the consumer tablet market and will power the affordable tablets.

If you want to experience the full power of Windows on a tablet or hybrid, choose a mobile device with Windows 8 or Windows 8 Pro. Restricted only by any hardware limitations, this will be the same OS that runs your PC and will run all existing and legacy Windows apps, regardless of whether they're designed for the new Modern UI or your existing x86 desktop. Windows 8 Pro on a tablet will be the most powerful OS ever created for a mobile device.

However, our view of RT against Windows 8 differs markedly from the blogosphere's, which has criticised RT for not being able to run legacy Windows apps. Our view is that if you want Windows on a tablet, chances are you won't want to do much more than run a web browser, email and Office apps, and RT does a reasonably classy job at these tasks. If you want to run heavy-duty software, chances are you'll do it on a PC anyway.

Q So will Windows RT do the job for me?

A If the majority of your Windows use is for Office, email and web surfing, then Windows RT is a brilliant option. If you've always longed to run Excel spreadsheets, write Word documents and create PowerPoint presentations 'natively' on a tablet, then a Windows RT-powered tablet will be a revelation, and we think it's actually one of the highlights of the entire Windows 8 release.

Office on Windows RT looks almost identical to the full x86 Office and even runs in a faux desktop environment. This is where some people have got confused. Even though you can switch to a 'desktop' environment on Windows RT, which looks just like that on your PC desktop, this environment only runs Microsoft's RT version of Office.

While there are new versions of some traditional Windows apps on the Windows Store already (and more coming all the time), be aware that if you want to run specific software you already own, don't pick Windows RT without confirming an RT version is available separately in the Windows Store. On the other hand, if you're happy with a tablet that can do practically everything Windows 8 Pro can do (except run apps from outside the Windows Store), Windows RT could be for you.

Q Does Windows 8 give Microsoft an advantage over Apple?

A The jury is out. While much has been made of the fact that Microsoft now gives you a clearly better platform for converged devices that can do both PC and tablet functions, we don't know whether people actually want a keyboard and more PC functionality for their tablets. Not having a keyboard and not running Windows apps hasn't hurt iPad sales so far, so are they something consumers really want anyway? If anything, Microsoft may be cannibalising the PC market, essentially giving PC users a new option in which they can get PC stuff done on a tablet in a way they couldn't on their PC.

In terms of usability, we think Windows 8 on a tablet is clearly superior to what you get from iOS – the Modern UI and Live Tiles give you a more modern experience (pardon the pun) and technically, the multitasking in Windows is more advanced. On the ecosystem side, it's not clear who has the advantage, though. Much has been made of Windows Store looking like a ghost town compared to the App Store with its trillions of Apps, iTunes and so on, but don't forget, Windows 8 and Windows 8 Pro (not RT) allow you to run the monstrous Windows x86 ecosystem on a tablet.

FINAL VERDICT

Microsoft is redefining computing with Window 8 and creating a new class of converged device that's a bigger threat to the PC and laptop than to the iPad. We're all for that because computing really shouldn't be limited to the static, overpowered dinosaurs that still crowd our desks or to the heavy portable devices that we call laptops. Windows 8 could well be the first OS that seamlessly lets you use a mobile device both at home and for work.

Should you upgrade? If you have a multitouch-enabled device, definitely. If you don't and have 'legacy' PC hardware, then Windows 8 doesn't give you any massive improvements over Windows 7. It comes with a Modern UI that turns from a princess on a tablet to a pig on a PC without a touchscreen. apc

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The iPad Mini: same old or new?

Apple finally announced its venture into the market for smaller tablets in October with the iPad Mini. Matthew J.C. Powell assesses the baby iPad.

Steve Jobs once famously derided 7in tablets as 'tweener' devices and joked that they would have to come with sandpaper, so users could make their fingers smaller. So after the iPad Mini announcement, Apple's Phil Schiller was at pains to point out that the iPad Mini wasn't a 7in tablet – it's 7.9in and apparently size does matter. Even 0.9 of an inch.

In its 7.9in diagonal screen, the iPad Mini packs a resolution of 1,024 x 768 – the same screen resolution as last year's iPad 2, though obviously with greater pixel density (163 pixels per inch). It also shares with the iPad 2 its CPU, the A5 dual-core system-on-a-chip (SoC). Any and all apps that will work on an iPad 2 will work on an iPad Mini, without modifications and without any software tricks to make them fit the smaller screen.

It would be wrong to characterise it as a shrunken-down iPad 2, however. Unlike the extremely limited cameras on the iPad 2, the Mini features a 5MP camera on the back and a 1.2MP camera on the front – adequate for making FaceTime video calls with 720p quality. The iPad Mini also features Bluetooth 4.0 and (optionally) LTE networking that will work in Australia. The iPad 2 has Bluetooth 2.1 and is limited to 3G.

Like all iPads, the iPad Mini is available in Wi-Fi-only or Wi-Fi+Cellular versions, the latter featuring wireless internet connections including LTE. Apple Australia got smacked on the wrist by the ACCC earlier this year for advertising the iPad 3 as Wi-Fi+4G when the 4G standards it supported weren't compatible with any Australian network. Lesson learned.

The other big difference between the iPad 2 and the iPad Mini is that the latter features Apple's Lightning connector, introduced with the iPhone 5 in September. At the same event the iPad Mini was announced, Apple also introduced the fourth-generation iPad (see the box opposite), which also features the Lightning port. That means Apple's full complement of iOS devices – iPod Touch, iPhone, iPad and iPad Mini – have all moved on from the 30-pin dock connector we've known for so long.

Interestingly, the iPad 2 (not the iPad 3) remains on sale alongside the new devices, at a reduced price. For developers this means they don't have to feel like they're abandoning opportunities for sales to buyers of full-sized iPads if they wish to target their apps at the iPad Mini. Some cost-conscious customers (and those with an investment in dock-equipped accessories) will likely buy the cheaper iPad 2 rather than splurging for the latest Retina display, and existing owners of the iPad 2 will be less inclined to sell their devices if the same specs are still available brand new. iPad 3 owners aren't so lucky, but that's another story.

CAN IT SUCCEED?

Despite having essentially defined the modern tablet computer and subsequently dominated the market, Apple has no 'first mover advantage' in the smaller tablet space. Google's Nexus 7, Samsung's Galaxy Tab 2 7.0 and Amazon's Kindle Fire have carved out comfortable niches for themselves, and Apple's introduction of the iPad Mini looks more reactive than innovative at first blush.

However, a hint at Apple's thinking can be found in the pricing of the device. At its cheapest, the iPad Mini can be had for $369, which gets you Wi-Fi only and 16GB of storage. The Nexus 7, by contrast, is under $300 for a similar configuration. Apple isn't going into the smaller tablet space to compete on price because it clearly doesn't feel that cheaper tablets are a threat.

When Apple weighed into the Flash storage-based music player market back in 2004 with the iPod Mini, it had neither the first such device on the market nor (by a fair margin) the cheapest. Apple was banking on the iTunes ecosystem, the superiority of the iPod user interface and the strength of its own brand to succeed. And it won – the iPod Mini was the most popular digital music player of its day.

Likewise, with the iPad Mini, Apple is banking that the success of current 7in tablets points to demand for something in that size range, but that demand isn't being satisfied. Apple is betting that customers want a better device, not merely a cheaper one. It's a bold bet – the kind of bet Steve Jobs might make. Whether it's actually provided a better device or not, you'll have to wait for our full review to find out. atc

The iPad Mini is just 20cm tall, 13.5cm across and 7.2mm thick. It weighs in at around 310g. The display packs a resolution of 1,024 x 768 – the same as last year's iPad 2, though with greater pixel density (163ppi).

A REFRESHED iPAD 3 & A NEW MACBOOK & iMAC

While the iPad Mini was obviously the star of the show at Apple's October launch, it was far from the only thing announced. There was the fourth-generation iPad, a mere seven months after the third-generation model hit the streets. The new version features an improved processor, a Lightning connector and LTE networking that will work in more countries around the world, including Australia.

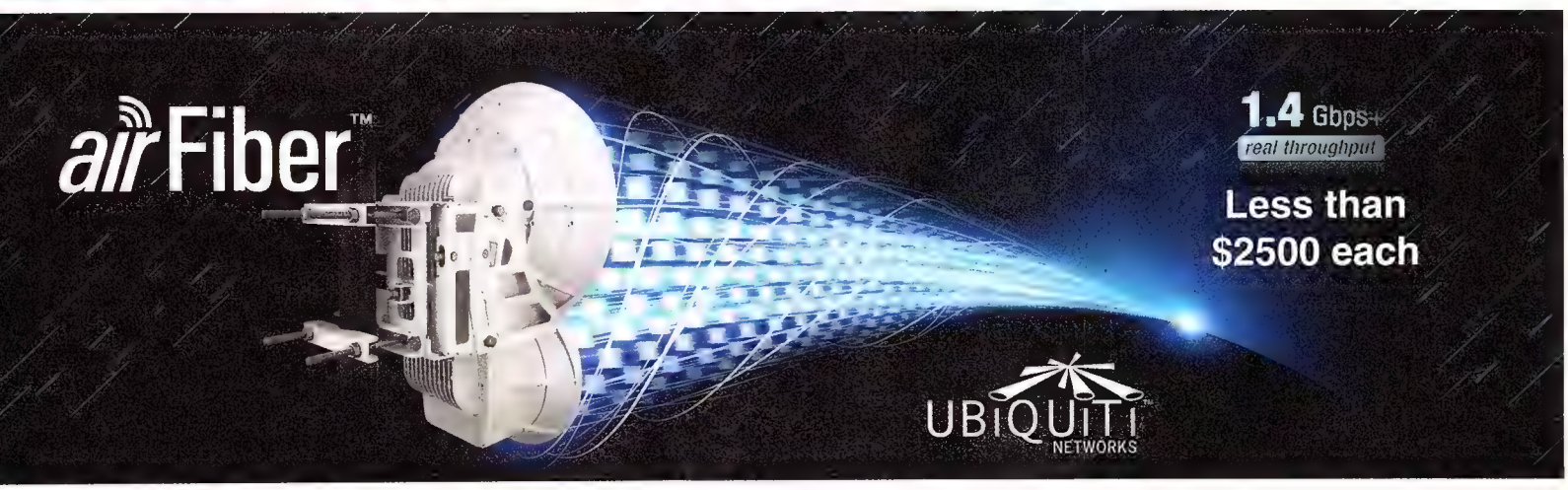
There was the widely anticipated 13in MacBook Pro with a Retina display, meaning the pixels are so small and so close together that at a normal viewing distance, eyes can't distinguish individual dots. The 2,560 x 1,600-pixel screen can display HD video at full resolution. The updated 13in MacBook Pro is also 20% thinner than its predecessor and features all-SSD storage for higher performance. The older, non-Retina 13in MacBook Pro remains available for those who want larger storage capacities – the new model tops out at 256GB of storage, compared to the older model's 750GB.

There was also a redesigned iMac, featuring a 5mm thick bezel displayed carefully so as to conceal the bulge in the middle, where the actual computer lives. The iMac's LCD is laminated directly onto the glass covering – a process borrowed from iPad production – and an anti-glare coating applied with something Apple calls a 'plasma-deposition process'. Basically, it's all really thin.

Inside the iMac is a 'Fusion drive' – a hybrid SSD and mechanical disk drive. It comes with the operating system and core Apple apps preinstalled on the SSD, with the mechanical disk used for user-installed applications and documents. Apple claims that with use, the Mac determines what applications are most commonly used and automatically optimises which applications live on which disk for the best performance. We'll believe it when we see it.

There was even a new Mac Mini, with faster processors and more RAM than previous configurations, the main improvement being USB 3.0 ports instead of USB 2.0 alongside Thunderbolt, HDMI and FireWire 800.

None of the new Mac models include an optical drive, continuing the process Apple began in 2008 with the MacBook Air of phasing out disc-based storage on its devices. It seems the future is all about high-speed networks as far as Apple is concerned. Now we just need those networks to arrive.



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www.freenet-antennas.com/af

14 gadgets

BY ANNA RACITI

US$99

Liquid Images Explorer Series Camera Mask

Take underwater photos while you're swimming with a school of fish, exploring a coral reef or just paddling in your backyard pool. This swim mask has a built-in 8MP waterproof camera so you can take still shots or video at depths up to 5m. There's 16MB of storage on board and a microSD card slot if you need more. The goggles are made of tempered glass, making them fairly tough. There's no built-in flash, but you can purchase attachable torches separately. Once you're done shooting, the camera connects to your computer for easy image transfer.

ONLINE www.liquidimageco.com

iCreation i700

I'm no hypochondriac, but I think I use my mobile phone too much and I don't like what that could be doing to my insides. That's why I like the iCreation i700. It's a cordless phone and iPhone dock that you can use for both landline calls and mobile phone calls. Once you've paired the i700 with your iPhone, you can answer calls to your mobile on the cordless handset, just by pressing the handset's iPhone button. You can also make mobile phone calls using the i700 – all without so much as touching your mobile phone.

ONLINE www.icreation.com

$129

$50

Jaycar USB Business Card Scanner

Sale reps drowning in business cards, consider yourselves saved. You won't have to manually enter your contacts' details into your PC again. This USB business card scanner from Jaycar takes a snapshot of your cards. The optical character recognition software then extracts the identifying names, companies, addresses and phone numbers. These can then be exported to mail clients, including Outlook.

ONLINE www.jaycar.com.au

$60

LEGO Star Wars Minifigure Clock

Not so long ago in a toy factory far, far away... two enormous marketing entities came together to create the ultimate alarm clock: the LEGO Star Wars Minifigure Clock. *Star Wars* fans of all ages can now wake up to Yoda, Boba Fett, a Stormtrooper or the evil Lord Vader himself. Each figurine stands around 22cm high and has movable arms and legs, and nestled in each figure's belly is a digital LCD screen with all the usual alarm clock functions and a night light.

ONLINE shop.lego.com/en-AU

$549

Fujifilm XF1

It's the size of a point-and-shoot camera with the specs of a digital SLR and its classy design is sure to turn heads. The XF1 is a camera made for those who like to mix quality and aesthetics. A 12MP sensor, f/1.8 aperture and 25-100mm lens will impress camera enthusiasts, while the rest of us can fawn over the light aluminium body with faux leather finish, and the retrolicious way you twist the lens to operate the camera's 4x zoom. Adding to the package are full HD video capabilities and a super-fast autofocus.

ONLINE www.fujifilm.com.au

$150

iDevices iShower

Stream music from your smartphone or tablet straight into your shower, bath or poolside. The iShower is a Bluetooth-enabled speaker that likes getting wet. It's water-resistant, so it can handle some major splashing while your iOS or Android device stays nice and dry (up to 60m away). The controls on the iShower let you can play and pause, and skip back and forward between tracks. The iShower also displays the time – handy for getting you out of the shower in time for work in the mornings.

ONLINE www.iworldaustralia.com.au

16 epinions
HAVE YOUR SAY

CASE MAKERS OUT OF TOUCH
Where are cases for SSDs?

Both Intel and AMD have decided what most buyers want is CPUs with integrated powerful enough GPUs. At the same time, motherboard manufacturers have decided that since these CPUs are well and truly good enough for most people, and since nearly everything anyone wants can be integrated into motherboards (rather than having to be added with expansion cards), most buyers don't need and won't want any more than a micro-ATX motherboard.

With USB drives getting bigger and faster, and the internet letting you download virtually everything, chances are you're using DVDs for not much other than loading your OS and drivers. So do you really need anything more than a plug-in USB DVD drive?

So why is it impossible to find in any retail shop compact cases that are just big enough for these boards and do have drive bays for SSDs that don't have cubic metres of destined-to-stay-empty 5.25in drive bays?

What about smaller power supplies with low enough power ratings that they're operating at optimum efficiency at their typical load, rather than running at a fraction of their rated capacity and adding to your already dramatically increasing power bills? It's like case and PSU manufacturers live on a different planet to chipset and motherboard manufacturers.

Gordon Drennan | Burton SA

GAMES SUBSCRIPTIONS

I have one little gripe with the November issue, namely the review of *Guild Wars 2*. On the negatives that you listed for the games, next to the cross, you had 'no subscription required'. Seriously? Are you insane? That's a massive positive! The game developers constantly update the game, they have seasonal events and did the same thing with the original *Guild Wars* and its add-on campaigns/expansions. How can having no subscription be a bad thing?

Shane Null | From the internet

REVIEWER TROY COLEMAN REPLIES: *We're willing to admit that this is a contentious topic and not everyone will agree – especially given the success of* Guild Wars *– but not having subscription fees can be a double-edged sword. Single-purchase MMOs often don't have much content longevity or ongoing development support for the fact that there's no incoming revenue stream as in those with subscription models.*

WINDOWS 8 CONCERNS

Reading your Windows 8 review I wonder what Microsoft thinks it's doing. Had Vista been released in 2012 and been up against iOS and Android, I wonder if Microsoft would still be in business today. A number of items in Windows 8 show cause for concern.

01 You can't dual-boot with ease. It's my computer so don't try to force me into your vision if I don't want it.

02 Internet Explorer that permits *no* plug-ins! Is it serious? How many third-party programs won't work, I wonder?

03 I can't get used to the two-faced nature of multiple half-baked desktops. Even Apple has kept OS X largely free of iOS pollution – for good reason.

04 I object to having to modify a brand-new OS to match the superseded version just to be able to function normally.

So, no thanks Microsoft! I'll pass until the urgent Windows 9 release in a year or two that corrects your flawed vision.

Ian Hollis | WA

WIN 8 PRODUCTIVE

Your article on whether to change to Windows 8 seemed all doom and gloom. I've been using Windows 8 since the Consumer Preview and I after initial aversion and lament over the loss of a 'Start' menu, I have come to thoroughly enjoy the new OS. It has encouraged me to become more keyboard oriented and I've become accustomed to using the extremely useful keyboard shortcuts Windows offers. I would say that I've become faster and more versatile using Windows 8 than Windows 7. Returning to Windows 7 is analogous to returning to XP after using Windows 7 – familiar yet cumbersome. Windows 8 brings the excitement of using a computer while increasing productivity and I feel that not recommending the change is detrimental to the progression of a powerful OS.

Kurt Lawrence | From the internet

EPINIONS@APCTEST.COM
Come on, have your say!

We want to hear what you think. Add to these discussions or email your views (in fewer than 250 words) to epinions@apctest.com. All correspondence becomes the property of APC and is subject to editing. Letters must include full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.

TOP PHONE ETIQUETTE BREACHES

We asked *APC* readers on facebook.com/apcmag to tell us the worst breaches of smartphone etiquette they constantly run into. Here's a list, so read and learn how not to annoy others with your mobile phone.

1 DRIVING WHILE USING THE PHONE

APC readers found this most offensive breach of phone etiquette. This causes accidents and several studies have revealed it's worse than drink driving. We see it all the time – believe it or not, we drove up behind a car stopped hallway up a freeway ramp in Brisbane because the owner was checking their mobile phone.

2 CONSTANTLY CHECKING YOUR PHONE DURING MEETINGS AND WHILE IN CONVERSATIONS

Readers hate being in meetings where someone constantly checks their mobile while they should be paying attention. These phone checkers are effectively telling everyone else they're not interested in what's going on, which is unprofessional. When away from work, the worst manifestation of this is when you're at the movies and someone starts checking their phone near you and the light from the phone bounces into your eyes.

3 PEOPLE INSTANT MESSAGING OR TEXTING EACH OTHER IN FRONT OF YOU

Nothing is more annoying that a couple of people near you – at their desks or in a meeting – who send instant or text messages to each other and chortle as they do. They could be discussing a private matter, but there's a greater chance they're discussing you, otherwise they'd have a normal voice conversation instead of using their phones.

4 PEOPLE TALKING LOUDLY ON PHONES

This is a weird, recent phenomenon and several readers complained about it. You can now get on a suburban train in any of Australia's capital cities and be treated to several people having loud conversations on their phones, discussing the most intimate personal or work details as if they're completely oblivious to the fact that strangers are sitting around them. The tragedy is that most of these loud conversations aren't the least bit interesting, but just parade the sheer banality of people's lives.

5 SELF-APPOINTED SOCIAL MEDIA REPORTERS

You're out at a party, a barbeque or even a work conference and someone decides to update their Facebook feed with dozens of photos that include you, helpfully tagged with your name as well. The problem here is that the photos aren't hand-picked by you for Facebook, but could be extremely unflattering as the photographer is using a mobile, often in badly-lit conditions. Worse, they could show you in a place you shouldn't be.

6 PEOPLE ON THE PHONE WHEN YOU'RE SERVING THEM

Several readers who serve people at counters said nothing's ruder than when someone shows up to pay for something, but barely acknowledges them because he or she is busy checking their smartphone. The transaction can be slower than usual and hold up others as a result.

7 PARTNERS THAT TEXT YOU BEFORE GOING TO SLEEP

It's 11.30pm, you're fast asleep and you get a goodnight text from your new girlfriend or boyfriend wishing you a nice sleep. Aaaarghhh.

8 iPAD PHOTOGRAPHERS

This wasn't raised by readers in the survey, but we've come across it in tourist spots. Just as you squeeze yourself into position to take a photo of a view, someone in front of you pulls out an iPad or Samsung Galaxy 10.1 and starts taking photos with it, effectively blocking out half your view.

ENDUSER

Share the hilarity!

Do you work in the IT industry and are forced to deal with inept and clueless end users on a daily basis? Do you have an IT professional, who isn't that 'professional'? If you have an interesting or amusing story, email us at contact@apctest.com. All correspondence becomes the property of APC and is subject to editing. Letters must include writer's full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.

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7/10 Acer Aspire S7

An aspirational rather than inspirational Windows 8 ultrabook.

LAPTOP

www.acer.com.au @

$1,999 $

Slim and attractive form factor, 1080p touchscreen, good performance. ✔

Only 128GB SSD, no compelling reasons to adopt touch yet. ✖

It's no big secret that Windows 8's core new element is touch and many of its new features, like the new 'Start' screen, work best with the touch interface of a tablet. Microsoft's new flagship OS is supposed to be as much at home on a tablet as a touchscreen-equipped laptop or desktop PC, however, and we're about to see a deluge of such machines, including all-in-ones, laptops and convertible tablet/laptop models.

The Aspire S7 is perhaps a little pedestrian by comparison to some of those, but it still packs Windows 8 and is overall one of the neater second-generation ultrabooks to pass through our labs. This thin slab of a laptop mixes in fairly standard ultrabook hardware under the bonnet (a low-power third-gen Core i7 CPU, 4GB of RAM, Intel graphics and an SSD) with some elegant design elements.

That design includes a 13.1in 1080p Gorilla Glass 2-clad touchscreen, a nicely sized trackpad and a specially designed hinge that holds the screen rigid to provide a more sturdy touch surface. That hinge also pivots 180°, letting you sit the unit flat for easier use of the 10-point touchscreen. (Windows 8 lets you rotate the onscreen interface, so you can flip it upside down to get the keyboard out of the way.)

So what does touch actually get you at this early stage of Windows 8's life? It's a bit of a mixed bag. There are already some appealing, touch-optimised apps and games available from the Windows Store. Touch games, in particular, are much more fun and immediate with direct interaction than they are trying to use a mouse cursor.

For apps, the benefit isn't quite so apparent – while touchscreen versions of most apps are typically cleanly designed, they're often stripped back compared to their desktop counterparts. And while Windows 8's onscreen keyboard is very responsive, when you're already married to a hardware keyboard with tactile feedback, it's the better option and it doesn't eat up precious screen real estate.

Using Windows 8's new 'Start' screen is without doubt best suited to touch – it's much quicker to swipe back and forth to view widgets or tap to launch apps than roam around with your mouse or a touchpad – but in theory, you won't spend as much time there as you will in apps. In other words, there's nothing especially compelling that warrants running out and buying a touchscreen laptop – at least not yet.

The S7 does thankfully have appeal elsewhere. Its thin, squarish design (weighing 1.3kg) actually makes it stand out in the ultrabook market and when closed it looks more like some high-fashion chopping board than a laptop (with Gorilla Glass on the lid, you could probably use it as one, too.)

The aluminium keyboard deck is likewise nice and rigid, and despite a plastic underside, the whole machine feels tough and sturdy, though perhaps not quite as much as ASUS's Zenbooks or a MacBook Air. That 1080p LED-backlit IPS screen is likewise a classy bit of kit, with great viewing angles and rich, natural colours.

There are one or two weak spots, though. The keys on the chiclet-style keyboard are a little short and soft, which can make accurate typing a little less comfortable than on the Zenbook or Air. Our other gripe is with the RRP. At $1,999, this is a premium-priced ultrabook – for that cost, we'd at least want a 256GB SSD rather than the 128GB one here.

It's still very early days for Windows 8 and touchscreen laptops and while neither may be a must-have now, there's definitely some potential. Touch interfaces certainly aren't going anywhere, though, so if you're keen to get on board early, the S7 isn't too bad an option.

Dan Gardiner

7/10 ASUS PB278Q

Not quite professional grade.

MONITOR

www.asus.com.au @

$700 $

High-res PLS panel, fast response time, even backlighting. ✔

Colours don't match its professional aspirations. ✖

Following on from last year's PA246Q, this 27in screen continues ASUS's push into the graphics professional market, with a spec sheet that looks well-suited to design work or especially pleasing media consumption. Indeed, between its PLS panel, fast 5ms grey-to-grey response time and high 2,560 x 1,440 resolution, the PB278Q looks every bit the equal of Dell's equivalent-sized UltraSharps. The panel technology impresses us the most: a Samsung-developed successor to the IPS tech in most high-end screens, Plane-to-Light Switching (PLS) panels boast improved brightness and wider viewing angles. Along with some nice additional touches, like the tilt- and swivel-adjustable stand, this definitely looks like a premium display.

However, the PB278Q falls short in some important areas. The basics feel like they've been glossed over. Given the tech used, this should be a pleasantly crisp, bright screen with well-balanced colours and 100% sRGB colour coverage. We don't think it is. At 100% brightness, it's not too bad, with relatively neutral whites, and good detail reproduction in some colour modes (curiously, not sRGB, which is far too blue). It struggles with colour representation otherwise, with a pronounced tendency towards overly cool hues and a rapid fall-off in image quality below 100% brightness, at which point images take on a sickly grey tone. That's not a great start for a screen aimed at graphics pros.

This is a bit of a shame because at $100 less than Dell's 27in graphics monitor – the U2713HM – and even more than the class-leading U2711, this has the potential to be a great-value screen. Hopefully ASUS's next effort in this space will make good on the promise shown here.

Dominik Krupinski

6/10 Samsung Series 9 S27B970D

Big and expensive, but not life-altering.

MONITOR

www.samsung.com/au @

$900 $

2,560 x 1,440 resolution, PLS monitor, HDMI input with MHL support. ✔

Not worth the price. ✖

Like most PC peripherals, monitors mostly sell on price, so the Series 9 has got to be good. You get a PLS panel, Samsung's take on IPS technology, with one or two twists. Next up is what you might call premium industrial design – a metal frame, brushed metal rear enclosure, soft touch controls and a general lifestyle vibe. The stand is height- and tilt-adjustable.

Then there's connectivity, which includes HDMI, DVI and DisplayPort, as well as MHL (Mobile High-Definition Link) to hook up Android phones. And that's about it – there's no TV tuner or app support – this is a pure PC monitor. The Series 9 will therefore live or die on a combination of image quality and physical desirability. Sadly, we're not entirely convinced by either. The chassis and stand are superficially sexy, but we'd rather have more adjustability and easier access to inputs. The latter are buried in the base, which makes plugging things in tedious. The biggest problem is image quality. That's not a result of a flawed LCD panel – it's lovely. The problem is that it's behind a so-called Crystal Clear Glass panel, so you can't see the LCD panel very well. It's a shame because Samsung's PLS technology is excellent. You get all the benefits of IPS, including superb viewing angles and colour accuracy, improved contrast and a smoother, less sparkly anti-glare coating.

The good news is that you can buy the Series 8 monitor, which has the same PLS tech in a more unassuming yet more ergonomic enclosure, minus the stupid panel cover. OK, you miss out on the MHL, but it's $200 cheaper, so it's a no-brainer.

Jeremy Laird

9/10 Plextor M5 Pro 128GB

The double threat of new memory and a new controller.

SSD

www.goplextor.com @

$165 $

New Marvell controller and Toshiba NAND, fast performance. ✔

A little pricey. ✖

The first drives we've seen flaunting Marvell's new 88SS9187 Monet controller come from what many might see as a surprising source, Plextor, in the guise of its new M5 Pro range. A quick glance at the specs reveals that the controller isn't the only thing that's new – these also sport the latest 19nm Toshiba Toggle NAND, making them the first consumer drives to do so.

Plextor's M5 Pro range quotes performance figures of up to 540MB/s reads across the board and while the write performance for the 128GB drive is quoted at up to 340MB/s, both the 256GB and 512GB drives get up to 450MB/s. In our tests with the ATTO benchmark, our 128GB unit backed up the official read figures, posting a score of 545MB/s. Write performance was a little lower than Plextor's figures at 326GB/s.

The Plextor M5 Pro can stand up to SandForce drives in outright performance and when it comes to handling incompressible data writes, it doesn't just hold its own against the likes of the SandForce-controlled Patriot Pyro SE – it takes it out into a darkened alley and gives it a good slapping.

This is the first consumer drive we've seen that uses the latest Toshiba NAND, although we're pretty sure it won't be on its lonesome for very long. It uses 256MB of DDR3 cache, while the 256GB version sports 512MB and for the 512GB drive it goes up to a whopping 768MB.

It's a brave step for a company to launch a new drive that features not one, but two new technologies, yet Plextor has pulled it off with the M5 Pro. Its performance puts it among the fastest 120/128GB drives we've tested. It's also reassuring to see that Plextor backs it with a five-year warranty.

Simon Crisp

5/10 Crucial v4 SSD 128GB

What's the real value of future-proofing?

SSD

www.crucial.com @

$105 $

Good performance for a 3Gbps SSD. ✔

6Gbps drives offer better value. ✖

While every man and his dog is throwing SATA 6Gbps interfaced SSDs at us as if there's no tomorrow, where does that leave everyone that is still packing SATA 3Gbps systems? Crucial's latest v4 family of drives attempts to build a 3Gbps SSD at a good price so that people with 3Gbps desktops or notebooks don't have to buy expensive 6Gbps models with features and performance they can't tap into.

While that would have been a sound idea when 6Gbps drives were relatively expensive, the SSD market has become a little more cutthroat sooner than most people expected. Right now you can buy SATA 6Gbps drives for almost the same price as the list price of the v4. Even Crucial has had to reduce the price of the 6Gbps m4 128GB to the point where it's only $25 more expensive than this drive. Go figure.

Crucial quotes sequential read/write figures for the v4 at 230MB/s and 175MB/s, respectively, which appears to be a bit on the conservative side, as we managed to get 274MB/s reads and 233MB/s writes via the ATTO benchmark. That's actually pretty good performance for a mainstream 3Gbps SSD drive, so things looked relatively promising at first.

Interestingly, the v4 is actually built around a Phison PS3105-S5 chip. The controller uses custom Micron firmware (version S5FAMM22) and supports wear levelling, garbage collection and TRIM. Unlike the LSI SandForce controllers, the data isn't compressed; instead, a cache chip is used to buffer

data, much the same way as the Marvell controller in the m4.

The drive is neatly laid out – on one side of the PCB is a Micron 166MHz DDR chip, which looks after the cache duties sitting alongside the Phison controller. These are joined by four of the eight 16GB 25nm Micron MLC synchronous NAND chips that make up the storage capacity, with the remaining four NAND modules on the other side of the board.

While the prices for the faster 6Gbps drives were much more expensive than 3Gbps, Crucial's v4 would have made sense, but the current SSD market has reduced that premium to almost nothing. It's pretty much a no-brainer: pay the extra and get a drive that's ready for you to upgrade in the future.

Simon Crisp

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Dedicated SERVERS

9/10 ASRock Z77E-ITX

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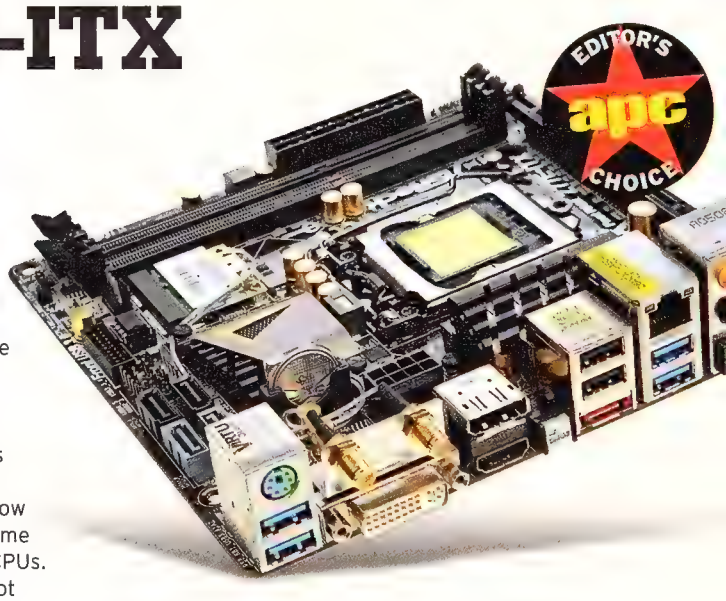
MOTHERBOARD

www.asrock.com @

$170 $

Full features, small form factor. ✔

Not really designed for overclocking. ✖



Thanks to some impressive design elements and the amount of motherboard real estate that's freed up by components moving onto the CPU itself, we're now starting to see boards in the mini-ITX form factor that are almost impossible to distinguish in performance or feature set from their full-size compadres. This ASRock board is another great example of this – and it's a relatively cheap one as well.

The Z77E-ITX is full-featured, including some additions you won't even get with full-size ATX boards at this price. The packed backplate should give you some idea of just how feature-rich it is. With three video outputs, it's quite at home running off the processor graphics inside the Ivy Bridge CPUs. There's HDMI, DisplayPort and full DVI, too. You've also got four USB 3.0 ports on the back, with a single header inside for those chassis' with front-mounted USB 3.0 ports.

And as well as a pair of SATA 6Gbps and a pair of SATA 3Gbps sockets on the top of the board, there's also an mSATA connector if you wanted to add in a PCB-mounted SSD for some space saving. There's even a second mini PCIe connector next to the DIMM slots fully laden with a Wi-Fi module.

So how does it perform? We weren't expecting a huge amount out of this wee board, but it can hold its head up. Turbo-ing at 3.7GHz it's no slouch, but it doesn't quite have the same overclocking chops without the extra power components of the competition. Still, it managed to hit a stable 4.5GHz and had enough juice to keep a discrete GPU flinging polygons around without any trouble.

For around $170, this is a great little board. It holds its own against the top mini-ITX boards and even against a lot of its full-size competitors. Performance aside, there's not really anything you're missing out on should you opt to buy this cheaper mini-ITX board. It's got every modern computing feature you could possibly want and would make the basis for an excellent little gaming machine.

Dave James

6/10 Zotac GeForce GTX 660 Ti AMP! Edition

A diminutive orange offering.

GRAPHICS CARD

www.zotac.com @

$365 $

Smaller than most, great performance. ✔

The Radeon HD 7950 is superior. ✖

We've been impressed by the overclocked AMP! cards from component-maker Zotac before, and it's trying to continue that trend with the GTX 660 Ti AMP! Edition. Where most other manufacturers have approached Nvidia's new GeForce GTX 660 Ti as just another big graphics processor (GPU) with high clock speeds, Zotac has been a little smarter.

Using the same reference PCB as the GTX 670, Zotac has managed to create a card with a far smaller footprint than the competition. You've got to give it props for taking a different approach to the others, especially considering it's managed to hit the same GPU frequency as the more expensive cards.

The AMP! is right up there with the big boys in terms of gaming performance. In fact, in some instances it manages to hit a higher boost clock for longer. That orange-tinged fan array helps the chip spit out the occasional higher frame rate than the standard GTX 660 Ti competition.

That still doesn't change the fact that there are AMD cards for the same money, which are generally speedier in gaming frame rates. You can also pick up a vanilla GTX 670 for another $50 more, which will take both the GTX 660 Ti and HD 7950 outside for a good kicking. That's before you think about the incredible overclocking potential the GTX 670 still has in its pocket.

While the Zotac GeForce GTX 660 Ti AMP! Edition is definitely the finest example of Nvidia's new card that we've seen to date, it still doesn't mean we'd recommend it over the superior GTX 670 or HD 7950 that it's up against. This is not the GPU to pick your battles with, Zotac.

Dave James

8/10 Samsung Galaxy S III 4G

Fast on data, poor on battery life.

SMARTPHONE

www.samsung.com.au @

From $51/month (Optus 24-month plan); from $66/month (Telstra) $

Extremely fast, great screen, comes with Android Jelly Bean. ✓

No battery improvements to counterbalance 4G. ✗

The 4G variant of the Galaxy S III keeps everything we loved about the 3G version, including the quad-core Exynos CPU, but doubles the RAM and upgrades to Android 4.1 along the way. As such, it's still a serious performer of a phone, managing a Geekbench 2 score of 1,693 and a Quadrant score of 5,078. That's on par with the 3G version, but with the added bonus of 4G LTE data speeds.

The phone was available initially on Optus, which is what we've tested it on, although a Telstra version is available now, too. As with all things 4G, be aware that speeds can vary depending on the time of day and location.

We hit highs as good as 37.79Mbps down and 22.5Mbps up in our testing within 4G zones. The Galaxy S III 4G still has the slightly plasticky feel of the original, although there's also a new colour scheme in subtle grey tones that makes it look a little better. Ultimately, though, that's an aesthetic consideration.

What hasn't been upgraded sadly is the internal battery, which clocks in at the same 2,100mAh as the original. That wasn't as much of a concern with a 3G-only phone, but when you're firing through lots of LTE data, the Galaxy S III 4G's response is to wave the white flag quite early on. With lots of careful usage balancing we just made it through an average working day, but even against its predecessor the conclusion was pretty inevitable: if you need the kind of raw processing power that the Galaxy S III 4G packs along with its LTE compatibility, you're going to need to carry a charger or supplemental battery with you a lot of the time.

Alex Kidman

8/10 Motorola RAZR HD 4G

Slick performance and great battery life, but it's not a slimline phone.

SMARTPHONE

www.motorola.com.au @

From $65/month (Telstra 24-month contract) $

Solid industrial design, 4G, great battery life. ✓

Heavy smartphone, ugly UI. ✗

Motorola's latest RAZR phone isn't actually all that thin; in a move away from models like last year's RAZR or this year's RAZR V, the HD is instead a solid lump of a phone, weighing in at 146g and 8.4mm thick all the way around. This isn't a razor per se, but it's a solidly built phone, if you like that kind of thing.

Motorola's part of Google now, but you don't get Jelly Bean on the RAZR HD yet – what you do get is Motorola's own tweaking around Ice Cream Sandwich. The single-flick 'Quick Settings' pane works well, but many of the other icons and UI shifts are a bit on the garish side. Being Android, of course, you're by no means stuck with them.

Performance on the RAZR HD's dual-core 1.5GHz processor is decent, with a Geekbench score of 1,457 and 4,932 in Quadrant. It's a Telstra exclusive through to the end of the year and it's yet another 4G-capable phone, which means in LTE zones it can be very quick. We hit peaks of 39.45Mbps down and 26.84Mbps up while testing in Sydney's CBD with the Speedtest.net app.

The HD's extra thickness does have one advantage, too, as it's allowed Motorola to include a hefty 2,500mAh battery. Motorola's claim is that this makes it an 'all day' phone and, while we were able to flatten it within a single day, it did take some work. 4G LTE is the noted enemy of battery life, but the RAZR HD packs in just enough power to counterbalance that nicely. You've got a compromise in terms of form factor to deal with, but if that doesn't concern you, the RAZR HD should suit you very nicely indeed.

Alex Kidman

HIGHLY apc RECOMMENDED

8/10 Jabra Solemate

A great partner for audio on the go.

BLUETOOTH SPEAKER

www.jabra.com @

$199 $

Compact size makes it very portable, pleasing audio reproduction. ✔

A little pricey, needs to be elevated to sound its best. ✖

The Solemate is a product that gets its name from its bottom – or more specifically, its sneaker-like rubber base. It's a Bluetooth wireless speaker that's designed to take a bit of rough and tumble. It has a built-in lithium ion battery and included protective pouch (water- and dust-resistant) so you can safely cart it down to the beach and stream tunes from your smartphone.

And despite its compact frame – it's about the same size and weight as a bottle of water – the Solemate produces pleasing and well-balanced audio. It's reassuringly hefty at 600g and is powered by three internal drivers: two 0.75in tweeters plus a 4in mid-woofer, which is channelled into a passive bass radiator in the back.

The latter adds a nice splash of reverb and resonance, and the unit pumps out a respectable (but not overwhelming) amount of bass on the whole. In fact, the Solemate responds well to most music types, so you can safely stock up your playlists with both Lil Jon and Johnny Cash without fear that one will sound awful.

The rechargeable battery lasted about 10 hours in testing and can be juiced up via a standard microUSB-B cable – the same one used with most Android smartphones. However, the battery gauge had a habit of cheerily telling us it was full, right up until it started complaining of being low. We also found the Solemate sounded best when elevated – it really needs to be at head height or higher to excel.

Those are minor niggles really and the only other problem is the price. At $199, you'll want to use it frequently to get your money's worth. All up, though, if you're after a speaker for your laptop or smartphone that can go anywhere (well, almost), this has the build and audio quality to let you do it.

Dan Gardiner

8/10 Belkin @TV Plus

Easy TV streaming, but there are hidden costs.

HIGHLY apc RECOMMENDED

TV CONVERTER

www.belkin.com/au @

$190 $

Simple TV streaming, works with tablets and smartphones. ✔

May require port forwarding, smartphone app costs extra. ✖

Belkin's @TV Plus G1V1000AU is a nondescript streaming box – you could easily mistake it for a router – that connects to any composite or component video source. Yep, that's right. No HDMI. This seriously limits the streaming quality output, but it does allow it to sidestep any content DRM, so you could use it to stream from any source that'll output that way.

Setup is quite simple via a provided software application and the @TV box supports both wired and wireless networking, so you don't need a connection port near your TV once the initial setup is complete.

Within the same network it'll stream to up to eight devices, but away from the network it'll only work on one. Belkin provides a free iOS/Android app for tablets, but the smartphone version is a rather more painful $13.99. For external streaming you may also need to set up port forwarding on your router; Belkin's notes suggest it should be handled via UPnP, but we had no luck there. Thankfully, Belkin's own instructions for port forwarding were pretty good – it's almost like it sells routers or something.

Once installed, remote streaming over 3G was surprisingly good. There's a little bit of obvious frame skipping in high action content and if your connection dips, quality obviously does as well. You can remote record files using the app, but again, the quality can be a little sketchy.

As long as you don't absolutely need any kind of HD video, the @TV delivers TV streaming to your mobile devices quite simply. It'd be better if the smartphone apps had the same software pricing and you'll need to keep an eye on data usage while streaming, but for utter TV junkies, this is about as easy as it gets.

Alex Kidman

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"ASUS's new 2560 X 1440 display is the perfect big screen for those on a budget."
PC Powerplay, October 2012.

"Top marks to this outstanding monitor."
Atomic Magazine, October 2012.

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atomic hotaward

8/10 SteelSeries Siberia V2 Frost Edition

Exactly like we remember, except a little bit different.

GAMING HEADSET

www.synnex.com.au @

$150 $

Ultra-comfortable, compatible with SteelSeries Engine. ✔

Non-braided cord, some build components feel a little cheap. ✖

The year-on-year minor upgrades of many gaming products can be confusing and sometimes easy to dismiss, especially if you're still rockin' an earlier edition and all the upgrades appear purely cosmetic or a simple livery change. That seems to be the case with SteelSeries' latest take on its core Siberia headset, the V2 Frost Edition. The foundations of the headset are largely unchanged, while previously optional extras have been brought on board and made standard.

The shape and build of the headset features the clever – and surprisingly uncopied – rigid overhead scaffolding with cable-suspended headband below. The classic design, coupled with pivoting circumaural (ie. over the ears, not on them) cans, provides lightweight and all-day, no, all-life comfort for any shaped head. In the guts of the closed-back cans are monstrous 50mm drivers tuned passively through the range, leaving the post-source processing to the now inline USB sound card and the SteelSeries Engine software. While fairly rudimentary software, we had no trouble tweaking the headset's settings to set up great-sounding profiles for the audio Holy Trinity: gaming, movies and music.

A new, yet simply cosmetic, feature of the Frost Edition is controllable blue lighting on the exterior of the cans, which at night resemble giant glowing blueberry bagels. Thankfully, you can switch it off. While we're on cosmetics, there are a couple of quality and build issues where the Siberia falls down. The materials on the inline volume control and USB sound card shells both feel cheap, as does the non-braided cable, which is about as accommodating and malleable as the Man of Steel.

It's not a revolutionary refresh – or a compelling upgrade to existing owners of the V2, but if you're looking for a great-sounding, long-lasting and ultra-comfortable headset for a fairly reasonable price, you won't be disappointed. Be sure to send us a pic of yourself wearing the bagels!

Troy Coleman

8/10 CM Storm Recon

The ideal mouse for Batman or closet crime fighters.

GAMING MOUSE

www.cmstorm.com @

$65 $

Powerful, rugged and comfortable mousing that makes you feel like Batman. ✔

Might not suit all users, non-braided cable, software is hard to navigate and decipher. ✖

If there was ever a mouse inspired by Batman's armoured Tumbler, this is it. The sleek, angular design coupled with the rugged, two-tone black rubber and massive ribbed scroll wheel screams of the Dark Knight's juiced-up ride. Despite its somewhat lithe form factor on paper (64mm x 116mm, a palm height of 42mm and weighing in at 139g), the Recon's tapered midriff shape and larger palm rest mean it can feel deceptively bulky in the hand. While that makes for a fine fit for those who like to rest their palm on their mouse, fingertip gamers may feel a little uncomfortable being forced to adapt their grip.

The layout of this ambidextrous crime fighter makes perfect sense, with all nine buttons symmetrically spread across the chassis and easily accessible without the need for awkward finger acrobatics. The Recon is just as responsive under the bonnet, too, and features 800 to 4,000dpi, a ridiculous 3,800mm per second velocity, 20g acceleration and a 1ms polling rate, all of which is customisable via the bundled software. While it's not incredibly user friendly or as easy on the eye as other customisation apps, it is extremely powerful. Once you've deciphered it, polling rates, LOD (lift off desk) settings, dpi sensitivity and the all-important LED colour scheme can be managed and switched on the fly.

The downside of the Recon is in the finishing touches that some other gaming peripheral makers offer as standard – a braided cord would have been a nice touch, as would a protective carry pouch. It might not be for everyone and we definitely recommend getting hands on before committing to a purchase, but the Recon is a powerful unit suitable for more applications than pure gaming.

Troy Coleman

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Learn why Clabby Analytics says IBM Flex System is the best blade offering in the market. Download the paper at ibm.com/au/no_compromise

[1] Based on IBM testing and documented in IBM System x® Virtualisation Server Consolidation sizing methodology. IBM Flex System x240 supports 2.7X more Peak Utilisation Virtual Machines (VMs) than previous generation BladeCenter® HS22V.

[2] Based on IDC white paper "The Economics of Virtualisation: Moving Toward an Application-Based Cost Model," Michelle Bailey, November 2009, http://www.vmware.com/fi les/pdf/Virtualization-application-based-cost-model-WP-EN.pdf Optional IBM Flex System storage node available fourth quarter 2012.

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HOW SITES GET HACKED

Jon Thompson shows you how attacks on sites are carried out and how to tell if you've been compromised.

What do the following companies have in common: Sony, eHarmony, LinkedIn and Formspring? They've all had their password databases hacked and released in the past year, either publicly or to the hacker underground.

A common factor among hacked sites is exposure of a database directly to the internet. While this is never a good idea, a site's network administrators might see it as a quick fix to get around a problem, intending to make it secure again sometime in the future. While the database is exposed, however, it's under threat.

Even if a site's servers are all kept safely behind a secure firewall, and connections to internal databases can only be made from internal systems, there are still ways of accessing their information. For example, when a normal user logs in, the software that checks their username and password will be accessing the back-end credentials database. It's sometimes possible to subvert this relationship to fool the software into thinking you've entered a good username and password combination, and that it should let you in.

The technique is called an SQL injection and it's remarkably simple to perform against vulnerable software. Let's say that when you log in to a web site, the software runs the following SQL query:

```
SELECT * FROM users WHERE username = ?USER' AND password = ?PASS'
```

USER and PASS are the variables containing the entered username and password. What this query does is return all rows from the users table, which contains columns for username and password. If there are none that match, the login fails, but if the number of rows is one, the credentials must match a record in the database. The username and password combination must therefore be valid, so the login software lets you in to the site.

So far, so good, but what if we don't know the username or password? This is where the SQL injection technique comes in handy. If you enter a username of 'OR 1=1 -- , then the query will become:

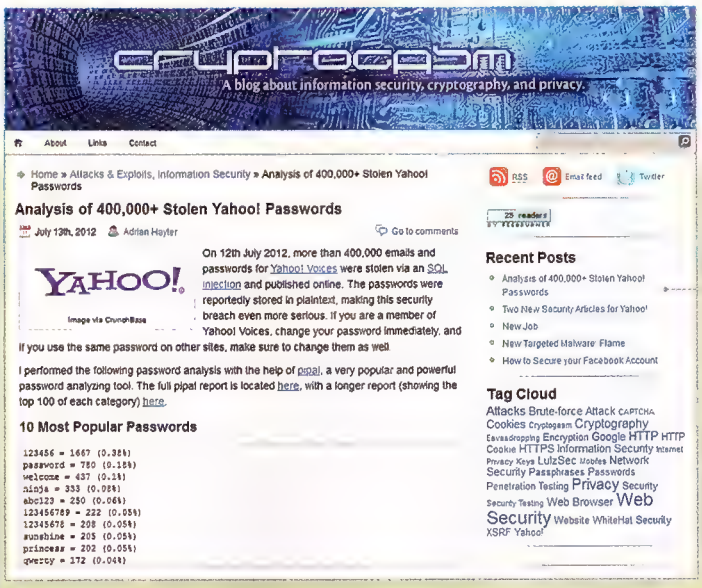
```
SELECT * FROM users WHERE username = 'OR 1=1' -- AND password = ?PASS
```

The double dash is an SQL comment, meaning the last part of the query dealing with the password is ignored. The username = 'OR 1=1" says 'look for a username; if none is found, it doesn't matter – just evaluate 1=1 and return that'. As 1=1 is always true, it returns a value of 1 to the login software, which assumes this is the signal that a valid username and password pair has been entered. Our hacker is in, without ever having to know any valid credentials.

Clearly, this is unacceptable. When checking an entered username and password, it's vital that the login software sanitise the input. This means stripping out non-alphanumeric characters to leave behind just the letters and numbers. SQL injections are used in many other ways to exploit connections with back-end databases. They're dangerous

because of the amount of personal data that can be uncovered for relatively little effort, but does this attack work in the real world? Yes, indeed. It can work very well against vulnerable web sites, as several high-profile news stories attest.

On July 12, news broke of a major SQL injection attack against a Yahoo subdomain, in which over 450,000 email addresses and plain text passwords were dumped to a hacking web site by a crew known as D33DS Company. The hack exposed the complexity of a commercial site like Yahoo, including as it did over 2,700 database tables and nearly 300 SQL variables. What's perhaps most dismaying about the attack is that according to online analysis, the most popular passwords in the dump were still the perennial favourites 123456 and password (**tinyurl.com/94g8h9m**).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Analysis of 400,000+ Stolen Yahoo! Passwords
July 12th, 2012
Adrian Hayter
Go to comments
YAHOO!
Image via CrunchBase
On 12th July 2012, more than 400,000 emails and passwords for Yahoo! Voices were stolen via an SQL injection and published online. The passwords were reportedly stored in plaintext, making this security breach even more serious. If you are a member of Yahoo! Voices, change your password immediately, and if you use the same password on other sites, make sure to change them as well.
I performed the following password analysis with the help of pipal, a very popular and powerful password analyzing tool. The full pipal report is located here, with a longer report (showing the top 100 of each category) here.
10 Most Popular Passwords
123456 = 1667 (0.38%)
password = 750 (0.18%)
welcome = 437 (0.1%)
ninja = 333 (0.08%)
abc123 = 250 (0.06%)
123456789 = 222 (0.05%)
12345678 = 208 (0.05%)
sunshine = 205 (0.05%)
princess = 202 (0.05%)
qwerty = 172 (0.04%)
RSS
Email feed
Twitter
Recent Posts
Analysis of 400,000+ Stolen Yahoo! Passwords
Two New Security Articles for Yahoo!
New Job
New Targeted Malware: Flame
How to Secure your Facebook Account
Tag Cloud
Attacks Brute-force Attack CAPTCHA Cookies Cryptogasm Cryptography Eavesdropping Encryption Google HTTP HTTP Cookie HTTPS Information Security Internet Privacy Keys LulzSec Hoaxes Network Security Passphrases Passwords Penetration Testing Privacy Security Security Testing Web Browser Web Security Website WhiteHat Security XSRF Yahoo!

An analysis of the dumped Yahoo passwords on the Cryptogasm blog reveals the most popular ones, including classics like password.

BROWSER ATTACKS

Things get worse when you consider that some simple injection techniques will also work from the address bar of a web browser. Such basic attacks can uncover unexpected information.

You can tell a web address that passes information to a back-end server from the question marks in the URL. The following URL fetches details for product 100 from the domain:

```
mysite.com/product.asp?id=100
```

The variable being set to the value 100 is `id`. This seems innocuous enough, but try the following:

```
mysite.com/product.asp?id=100 AND id=101
```

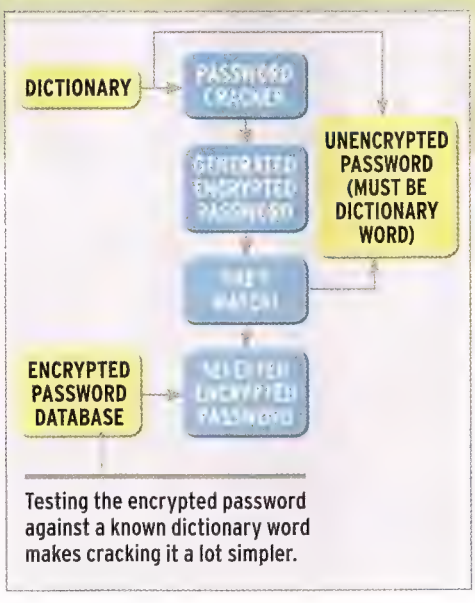
You could retrieve the details for both products. This is useful if you know the ID of a product or some other information you want to see – just enter the relevant value in the URL. However, we might also be able to inject a little SQL to get other information back from the database:

```
mysite.com/product.asp?id=100 UNION SELECT username, PASSWORD from users
```

This asks the database to give us the product details for item 100, but also tells the SQL engine to combine this with the usernames and password from a table called `users`. Most sites filter out SQL from URLs before using them, but in some cases where naive developers have not done so, the results can be devastating. Along with details for product 100, you could get a dump of all usernames and their associated passwords.

SALTED PASSWORDS

Ah, but aren't passwords and other credentials stored encrypted? Yes, they are (or should be), which should mean that any stolen data is useless. However, password cracking has become more sophisticated.



Testing the encrypted password against a known dictionary word makes cracking it a lot simpler.

A credentials database should never store passwords in plain text. Instead, each password should be encrypted and then stored. The encryption technique is asymmetric; that is, you can't work backwards through the algorithm from the encrypted data back to the plain text password. When someone enters a password to log in, the text is encrypted and tested against the encrypted version stored with the username. If they match, the passwords must be the same and the user can log in.

Remarkably, this method is vulnerable to attack. If an attacker can dump the password database to their computer, they can encrypt each entry in turn from a file of carefully selected test words (called a dictionary) and test each against the password under consideration. If a pair of encrypted words match, they know the original password. This may sound laborious, and it is, but the attacker may be using a cluster of computers all working on a small part of the password file in parallel, making it quite an efficient attack. The dictionary will begin with obvious passwords and the logic controlling the attack will replace vowels with letters, use upper- and lower-case combinations, glue words together and so on.

To enhance the brute force attack, the dictionary will be pre-encrypted into something called a rainbow table, containing the encrypted and plain text versions of all the word combinations. This table enables the password cracking software to quickly compute the mappings between the encrypted password and the rainbow table to dump all the plain text passwords.

Because of this, the encryption algorithm that codes the passwords in the first place can take a second value called a salt. The salt value further convolutes the output of the algorithm so that simply encrypting a dictionary and comparing the output with individual encrypted passwords is useless. The salt must also be computed, so for every password, the possible combinations must be multiplied by all possible salt values.

To further thwart password cracking software, there may be more than one salt in use. To even compute a rainbow table, the attacker must use all possible combinations and store them in a huge database.

The resources needed to brute force passwords protected by any one of multiple salt values are massive.

Earlier this year, networking site LinkedIn had its user database stolen, possibly via an exploit in its web interface. The site had used the secure SHA-1 algorithm to encrypt its passwords, but what shocked security pundits most was that the 6.4 million stolen passwords hadn't been salted as part of that encryption.

THE TINY PC CRAZE

The CPU revolution that's made smartphones and tablets possible is now shrinking PCs as well. Darren Yates explains why ARM processors are reshaping personal computing.

By sheer numbers, it's the biggest CPU designer in the world, claiming over 16 million chips shipped every day and more than 30 billion in existence. It has a close working relationship with Apple and it's about to get a boost from Microsoft's newly released Windows 8 operating system. But we're not talking about Intel.

Its technology is found in processors manufactured by a raft of big market players, including Qualcomm, Samsung, LG, Broadcom, Nvidia, Texas Instruments – even Apple itself – and it powers most of the 153 million smartphones reported by industry analyst IDC to have sold globally in Q2 2012.

With the release of new Windows RT tablets, it's also about to provide Intel with its first serious competition for some time in the Windows market. It's also the name behind Apple's new A6 processor inside the iPad Mini. Welcome to the world of ARM.

WHO IS ARM?

ARM's history dates back to 1990 when three companies – UK-based Acorn Computers, Apple and US chip manufacturer VLSI Technology – formed a joint venture called Advanced RISC Machines (ARM). Acorn Computers was best known for its famous 'BBC Micro' computer of the early 1980s and had since developed a new simple processor, while Apple was reportedly looking for an energy-efficient CPU for a new idea and VLSI Technology specialised in making very large-scale integration chips. The joint venture aimed to develop Acorn's low-power RISC (reduced instruction set computing) chip technology. One of its earliest successes was its 20MHz ARM610 processor inside the Apple Newton PDA in 1993.

Unfortunately, the Newton failed to take off and it wasn't until Compaq introduced the iPAQ H3100 PDA in 2001 – based on an ARM and Digital Equipment Corporation (DEC) co-developed StrongARM chip – that ARM would hit the consumer mainstream in a significant way.

Within five years, the PDA market had softened. In that time, Apple had been working on its own smartphone and chosen its old venture partner to power it. Today, every iPhone, iPad and about 95% of their Android competition all run processors using ARM technology.

The BBC Microcomputer, developed in 1981 by Acorn Computers.

Apple's Newton was one of the first examples of ARM's future use.

Compaq's first iPAQ, the H3100, launched in 2001, powered by DEC's SA1110 StrongARM CPU.

Apple's iPhone 3GS brought ARM into the mainstream.

The iPhone 5 might run Apple's A6 CPU, but it's based on ARM technology.

INTEL VS ARM

ARM is something of an anomaly in the CPU business in that it doesn't actually manufacture processors. Instead, it licenses its intellectual property to household names like Samsung, Apple, Toshiba – even Intel itself is said to have paid up membership to the ARM fan club. Except these days, there's not much love lost between these two. With Intel owning the desktop and laptop markets, and ARM having almost the entire smartphone and tablet business in its back pocket, the companies are posturing like two kids spoiling for an after-school fight.

The relationship between Intel and ARM is somewhat cloudy. A report last year stated Intel said it had an ARM licence, but somewhat defiantly, had no plans to use it (**tinyurl.com/5ux4ou9**). However, earlier this year, it was reported that ARM's greatest revenue-raising client in 2010 was none other than Intel (**tinyurl.com/75bojhr**). Tensions between the two are brewing because neither is prepared to keep to its own patch – Intel will push hard in the mobile market with its upcoming Medfield Atom, the chip giant's most power-efficient CPU by a mile; it has at least one smartphone win, being used in Motorola's RAZR i.

However, more significant (at least in terms of potential dollars) is the growing push to get ARM technology into servers. ARM recently announced it had boosted the cache and memory controllers of its existing server-focused core designs through a new CoreLink CCN-504 controller. Cache and memory controller functionality is a key factor in server performance and ARM's announcement is designed to help it better compete with Intel. ARM server startup Calxeda claimed in June that its tests had shown its 5W ARM server was 15 times more power-efficient than Intel's Xeon chips on a performance per watt rating. Intel fired back with its own tests in August, rejecting the Calxeda claims.

One thing is certain: with electricity costs rising around the world, power efficiency is the next battleground for the major CPU players. And ARM's arrival into the Windows tablet market will raise the stakes higher.

INSIDE ARM ARCHITECTURE

ARM started with a simple nomenclature for its core designs and architecture: core families were known as ARM1, ARM2 and so on, while its architecture generations were known simply as ARMv1, ARMv2 and so on. What made ARM impressive initially was its comparatively simple design. The original ARM1 core developed by Acorn Computers in 1985 had fewer than 25,000 transistors. The follow-up ARM2 arrived in 1986, added a genuine 32-bit wide data bus, but still only a 30,000-transistor count. By comparison, Intel's 80386 chip released the year before featured 275,000 transistors. ARM3 saw clock speeds hit 25MHz and the acquisition of 4KB of onboard cache memory.

At this point, Apple's decision to join Acorn and VLSI to create ARM in 1990 was pivotal. The first result of the joint venture was ARM6, which had by that time developed into a fully static design, meaning you could drop the clock speed to zero to reduce power consumption.

The failure of the Newton coincided with the dual nomenclature getting out of sync, with the ARM8 CPU family arriving with ARMv4 architecture. But it was ARM8 and its StrongARM derivative that provided the first inroads into the mainstream, thanks to its ability to run Microsoft's Windows CE operating system. Compaq's iPAQ PDA range, which initially ran DEC-designed StrongARM ,chips later fanned out to include Samsung's newer ARMv5-based S3C2400 series and Intel XScale PXA CPUs after HP took over Compaq in 2002.

By the time ARMv5 arrived, the ARM10 CPU design had become XScale under Intel (acquired from DEC in 1997 as part of a court settlement), appearing as the PXA270 and 310 processors, running as high as 624MHz. ARM10 added increasing complexity including digital signal processing (DSP) capacity.

However, the PDA market was flagging and Intel offloaded the XScale PXA design to Marvell Technology. Yet Intel continued its dalliance with ARM technology with one last effort, announcing in April 2007 the 1GHz ARMv5TE-based CE 2110 media processor, featuring 2D/3D graphics and

MPEG-2/MPEG-4 video acceleration. It would later become clear Intel had other things on its mind after that, namely its own low-power x86 chip released in 2008 as the Atom.

While the first netbooks were based on underclocked Celeron-M chips, the Atom became synonymous with the ultra-compact laptop design. As an aside, by 2010, China was awash with sub-$200 7in netbook knockoffs powered by VIA WM8505 ARMv5-powered CPUs and Windows CE.

ARMV6: THE SMARTPHONE ARRIVES

It's no exaggeration to say that the ARM11 core family and its ARMv6 architecture spawned the current smartphone era, with Apple choosing the ARM1176JZ(F)-S CPU core as the heart of the original iPhone in 2007 and iPhone 3G in 2008. Interestingly, one of the ways Apple obtained what was (at the time) unheard of battery life was by simply underclocking the chip from its 620MHz base rate down to 412MHz.

ARMv6 provided significantly improved MPEG-4 video decoding, thanks to its SIMD multimedia instruction set, a first for an ARM design. It also incorporated out-of-order instruction processing and improved power management.

The original iPhone is now long gone, but despite having been surpassed by newer alternatives, ARMv6 is still kicking. HTC tapped Qualcomm's ARMv6-based 528MHz MSM7227 as the CPU inside its Wildfire and the (still currently available) Wildfire S smartphones. But it's also gaining a whole new legion of fans, thanks to Broadcom's 700MHz BCM2835 CPU, better known as the soul of the popular Raspberry Pi single-board computer (SBC). ARMv6 has also moved into industrial markets inside low-power versions of the newer Cortex-M series of embedded application processors or 'microcontrollers'.

ARMV7: NEW SUPERPHONES

Today, almost every flagship smartphone from the iPhone 5 to Samsung's Galaxy S III and even the upcoming Windows Phone 8 handsets is built around the ARMv7 architecture. ARM also used its arrival to introduce the Cortex core brand.

The Cortex series is at the same time an expansion and consolidation for ARM, consisting of Cortex-A, Cortex-M and Cortex-R core designs. Cortex-R is aimed at automotive and communications applications; in fact, it's often used in the mobile baseband subsystem of smartphones to do the actual data/voice transmission to your service provider. Cortex-M processors are designed with low power consumption and low cost in mind. Initial Cortex-M0 and M1 CPUs use ARMv6 architecture while newer M3 and M4 cores are ARMv7 compliant.

CORTEX-A SERIES

It's the Cortex-A series you're more likely to have heard about and more than likely used already. Yet even here, there are several members of the A-series family. The first release was the Cortex-A8, the design behind the Apple A4 chip launched in the iPhone 4 and original iPad. The Cortex-A8 introduced integrated L2 cache RAM up to 4MB, core clock rates beyond 1GHz and the NEON SIMD instruction set, capable of decoding MP3 audio with a clock speed of just 10MHz.

It appeared in numerous Android phones using the original Qualcomm Snapdragon/Scorpion CPUs such as the HTC Desire/Google Nexus One, along with Samsung Exynos 3110 CPU-powered designs, including the first Galaxy S smartphone and Galaxy Tab tablets.

Today, it still sees occasional use in new phones such as the HTC One V, but thanks to Chinese chipmaker Allwinner, Cortex-A8 powers many of the new mini PC/computer-in-a-stick devices such as the $50 MK802 through its Allwinner A10 CPU. It's also the CPU technology behind carmaker Ford's SYNC in-car entertainment system, introduced in Australia in September and powered by Freescale's 600MHz i.MX516 Cortex-A8 CPU.

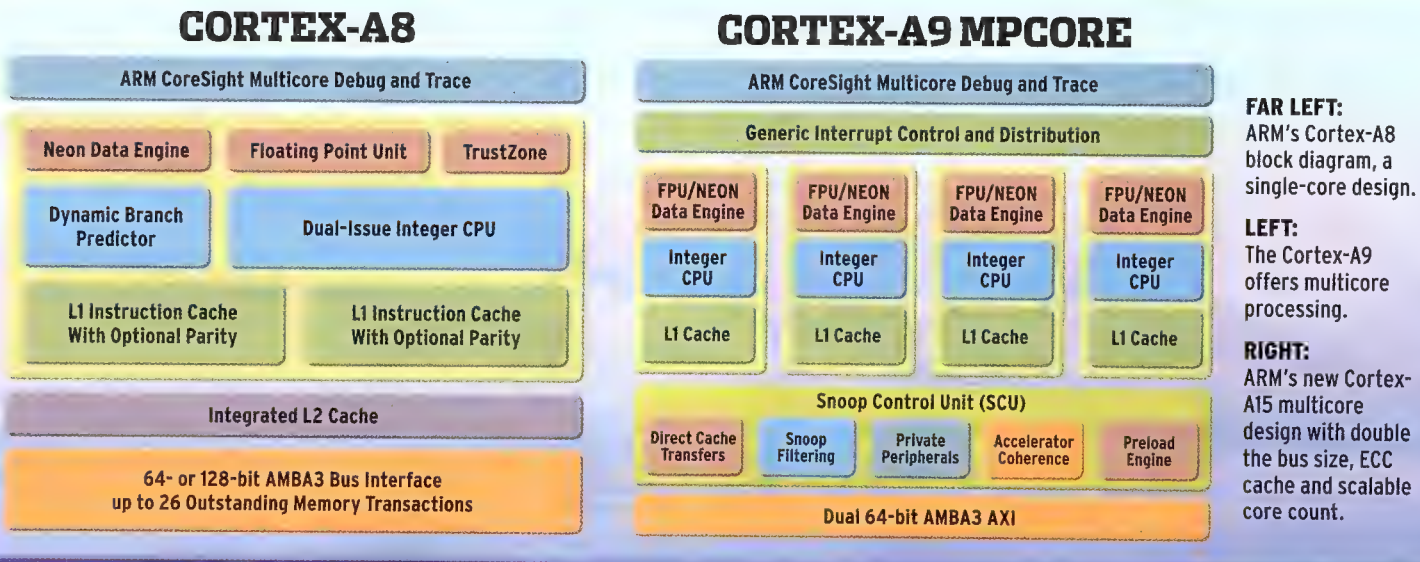
However, up to this point, virtually all ARM designs had been single-core only. Nvidia's first Tegra chip, the APX 2600, which powered Microsoft's Zune HD player, was one of just a handful of dual-core ARM11 designs. Enter Cortex-A9 with its multicore option in late 2010. The A9 design became the basis for the first round of dual-core Honeycomb (Android 3.x) tablets using Nvidia's Tegra 2 T250 processor and continues today with the quad-core Tegra 3 inside the Google Nexus 7 tablet. Samsung also tapped the A9 for its own Exynos 4412 chip inside the Galaxy S III smartphone.

The range has since expanded to include the Cortex-A5, the smallest member of the family, but still fully compatible with other A-series cores, achieving power rates of just 80 microwatts per MHz and generally sub-800MHz clock rates. Its applications range from basic smartphones to electricity smart meters and DVD players.

However, all eyes are on the upcoming Cortex-A15, which promises to deliver significant speed gains. It's claimed that A15 will run at up to 2.5GHz per core and it's also highly scalable, allowing for not only dual- and quad-core designs, but octo-core and beyond. That said, ARM initially stated that Cortex-A9 would only clock up to 2GHz. Yet chip foundry TSMC in May this year announced it had pushed a Cortex-A9 core up to 3.1GHz, so it remains to be seen just how far A15 will go.

The first cab off the rank for Cortex-A15 will be Samsung's dual-core Exynos 5250, appearing in the new Galaxy Note II smartphone/tablet crossover, likely followed by the quad-core Tegra 4 T40 from Nvidia early in 2013.

ARM's plans for Cortex-A15 are substantial and for the first time include a 'companion' CPU in the new Cortex-A7. The A7 is an SoC CPU in its own right, delivering 2010-era performance inside new entry-level sub-$100 smartphones and as much as 20% more speed than 2011 mainstream phones while using 60% less power. However, it's in its companion role with the A15 ARM calls 'big.LITTLE processing' (bLp) that we'll see the most significant expansion. The concept allows



FAR LEFT: ARM's Cortex-A8 block diagram, a single-core design.

LEFT: The Cortex-A9 offers multicore processing.

RIGHT: ARM's new Cortex-A15 multicore design with double the bus size, ECC cache and scalable core count.

Cortexm3.jpg – Philips' spin-off NXP's LPC1760-series microcontroller is based on ARM's Cortex M3.

devices to incorporate both A15 and A7 cores, with software code automatically switching between them as necessary, giving the device the benefit of the A7's power efficiency and the A15's performance. Using this technique, battery life could be boosted by up to 70%. At this stage, it's not clear when we'll see bLp devices hit the market, although Samsung has signed on for A7 and A15 licences, so it could come from the Korean giant first. The first A7-based smartphones are expected in the 2013-14 time frame.

ARM GPUs

The growing demand for 3D graphics meant CPU design was no longer enough. In 2007, ARM introduced the Mali brand for its graphics, video and audio processors, but it's the GPU development that's received most attention. Its introduction more or less coincided with ARMv7 and began as the Mali-200, offering OpenGL ES 2.0 graphics up to 1080p resolution. But its most well-known part to date is the Mali-400 core, popularised in Samsung smartphones. However, because ARM uses the open-standard AMBA AXI (Advanced Microcontroller Bus Architecture – Advanced eXtensible Interface) bus, chip designers can either choose a Mali GPU for a one-stop shop solution, or use other AMBA-compliant GPUs. For example, Qualcomm uses its Adreno 200-series GPU, originally sourced from ATI, inside its Snapdragon Cortex/ARM11 CPUs while Nvidia uses its GeForce GPU technology in Tegra chips.

Like its Cortex CPUs, ARM's Mali-400 GPU can be run as single- or multicore designs. Allwinner's A10 Cortex-A8 chip uses a single Mali-400 core while Samsung's quad-core Exynos 4412 Cortex-A9 CPU runs four Mali-400 cores.

MALI-T600 SERIES

The first Mali-T600 GPUs are about to appear in a range of products including Samsung's Cortex-A15-powered Exynos 5250 chip inside the Galaxy Note II. The new smartphone crossover will feature four Mali-T604 cores. But what makes the T600 series important is that it's the first DirectX 11-ready ARM GPU, making it vital for Microsoft's Windows RT tablet assault.

With Microsoft tapping ARM as its consumer tablet CPU choice, it's no wonder ARM and Intel are going at it hammer and tongs.

While the Mali-T604 processor will be the first release, ARM is already pushing prospective clients towards the uprated Mali-T624. The main difference is that the T624 adds new OpenGL ES 3.0 graphics whereas the T604 tops out at 2.0, although both can scale up to as many as four cores in a design.

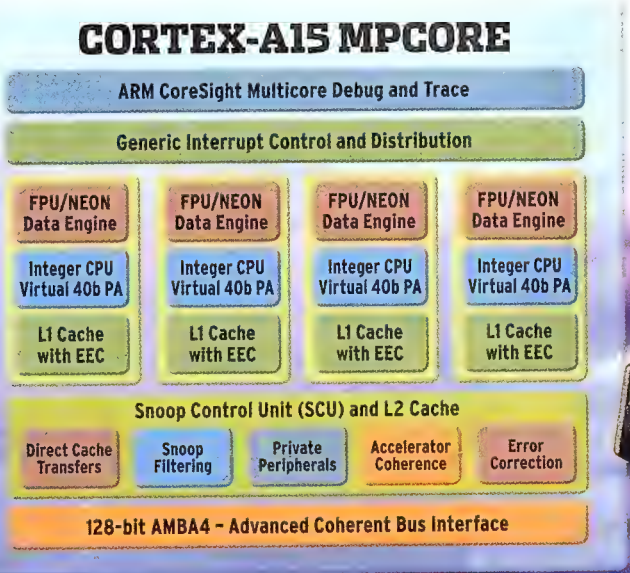
Apple's new A6 processor, built on ARMv7 architecture.

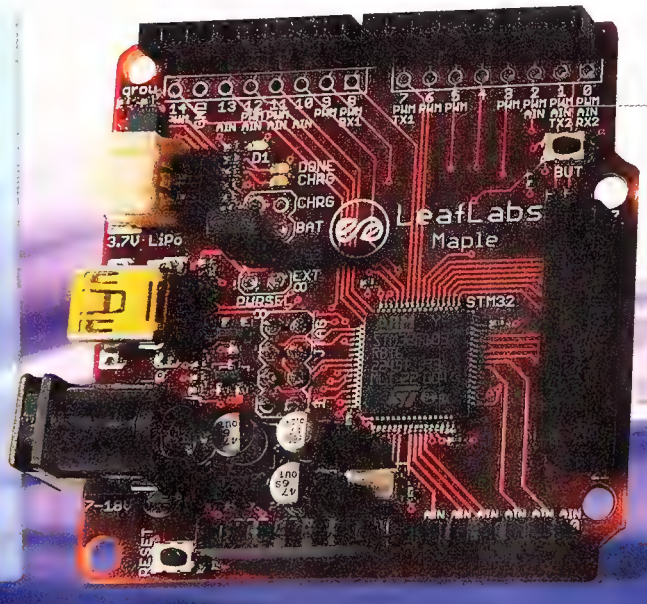
Galaxys3.jpg – Samsung's Galaxy S III, running its own Exynos 4412 quad-core Cortex A9 processor.

However, gamers are likely to be sweating on the arrival of the new Mali-T6x8 GPU series. With the same basic architecture features as the T6x4 range, the T6x8, starting with the Mali-T628 GPU, will support as many as eight cores. The Mali-T658 is said to deliver up to 10 times the graphics performance of the Mali-400 and four times the Mali-T604. The Mali-T678 is claimed by ARM to be an updated version of the T658, although the company offers no additional information, so it's unclear whether or not this is simply a higher-clocked option.

A BUSY FUTURE

While AMD and Intel are busily guarding their CPU designs (and both have issued profit warnings in recent weeks), they barely figure in the mobile market. ARM's success has come from its decision to license its technology at a low enough cost to attract as many as 900 manufacturing partners. With the 64-bit ARMv8 architecture just around the corner, it's quickly becoming the must-know technology.

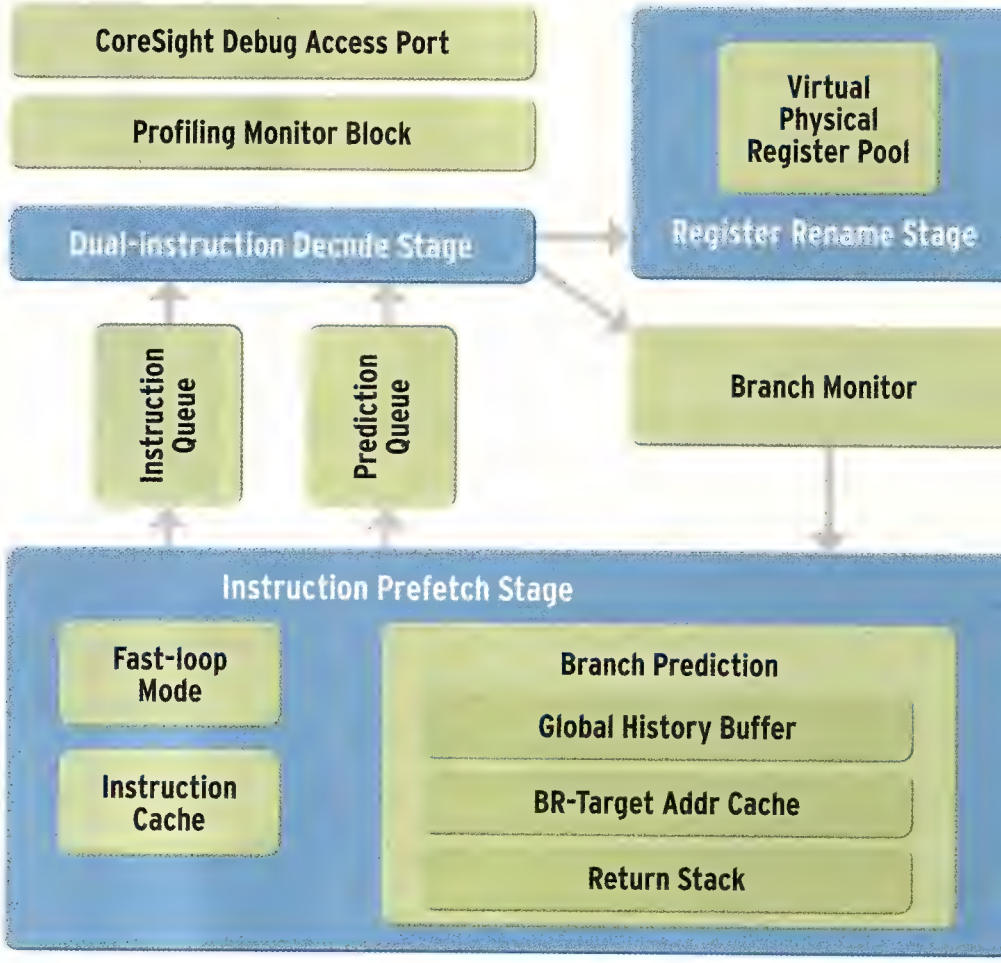




LeafLabs's Maple development board brings ARM Cortex-M0 speed to Arduino hobbyists.

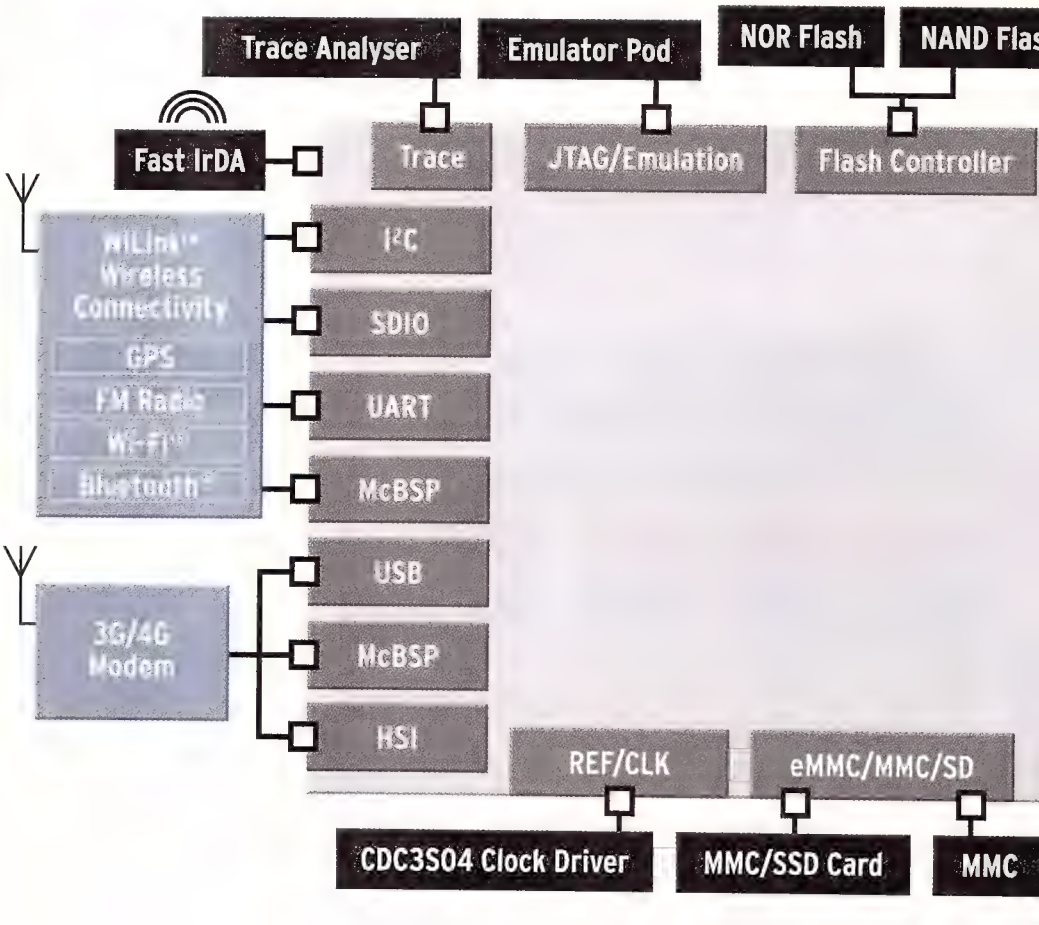
ARM Cortex-9: how it works

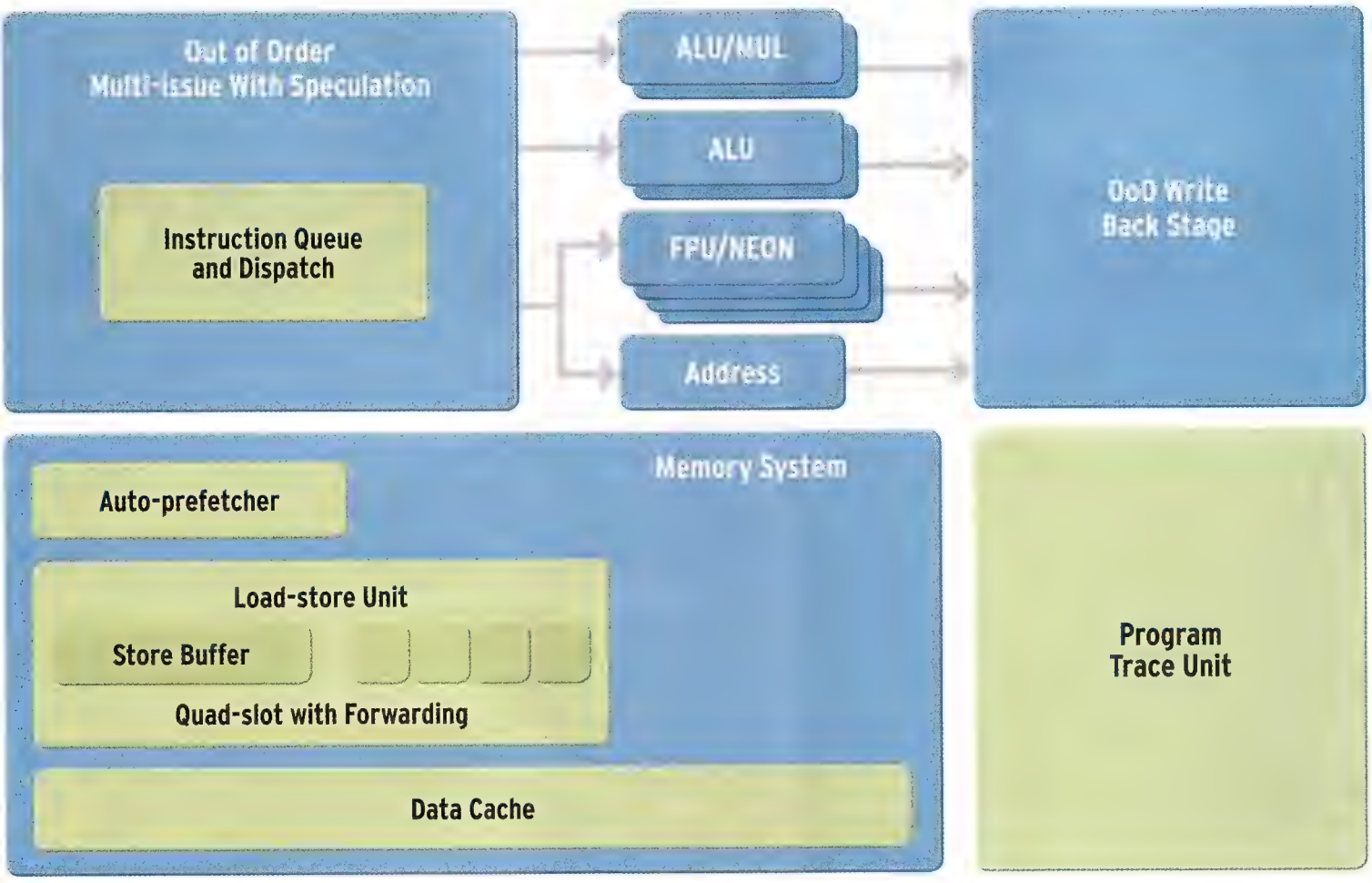
Code processing inside the Cortex-A9 pipeline starts with the instruction prefetch stage, which initiates new instructions and branch prediction (for example, if... then... else...) to speed up performance through a branch monitor. It's then copied into the various required registers before being processed by the appropriate engine – the SIMD/floating point unit (FPUs) or arithmetic logic units (ALUs). The memory management unit (MMU) keeps track of the allocation and location of data during the process.



ARM Cortex-9: how it works in practice

The Texas Instruments dual-core ARM Cortex-A9 OMAP4470 processor is the base for Amazon's new Kindle Fire HD tablet, but this graphic shows how ARM technology is incorporated by a licensee into a possible smartphone design. What should be clear is that while the Cortex core is an important part of the CPU, SoCs like this have to be able to handle almost every device function, with only specialty functions outsourced to other chips (for example, modem, power management, audio and so on).

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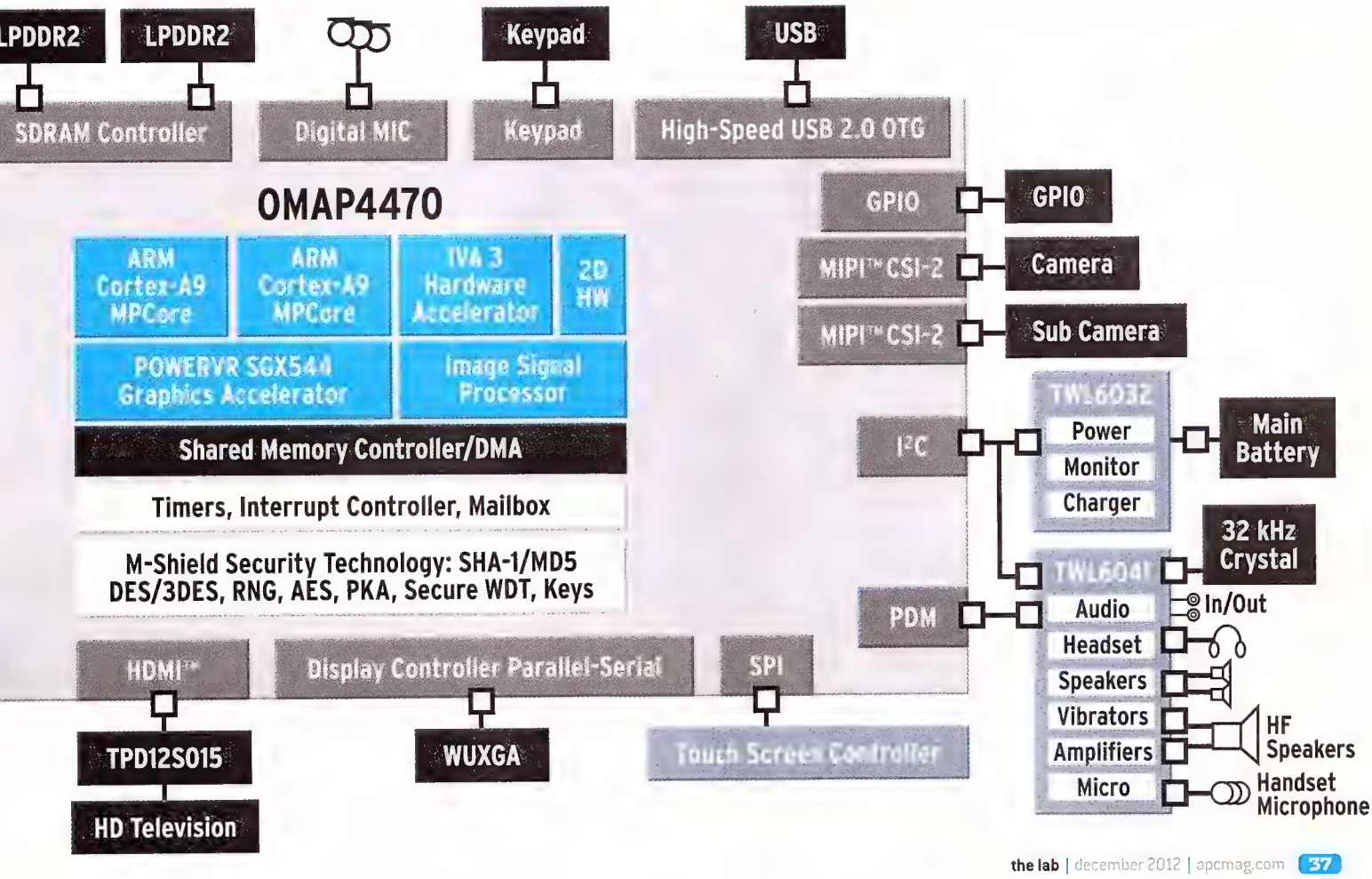
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SDRAM Controller
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ARM Cortex-A9 MPCore
IVA 3 Hardware Accelerator
2D HW
POWERVR SGX544 Graphics Accelerator
Image Signal Processor
Shared Memory Controller/DMA
Timers, Interrupt Controller, Mailbox
M-Shield Security Technology: SHA-1/MD5
DES/3DES, RNG, AES, PKA, Secure WDT, Keys
HDMI™
Display Controller Parallel-Serial
SPI
TPD12S015
HD Television
WUXGA
Touch Screen Controller
GPIO
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MIPI™ CSI-2
Camera
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Charger
Main Battery
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TWL6041
Audio
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Vibrators
Amplifiers
Micro
HF Speakers
Handset Microphone

MINI PCs FOR UNDER $100!

Is this the end of high-priced computing? Darren Yates rounds up half a dozen single-board computers under $100.

ARM may well be the processor backbone of the global smartphone and tablet industry, but the low cost of licensing its technology has recently made possible a breakthrough in computers that are small enough – and cheap enough – to fit in the palm of your hand.

The $38 Raspberry Pi is the flag-bearer for this new breed of super-cheap computer. It's a revolution that's barely five months old, but in that time we've seen an explosion in the number of models flowing from Chinese factories, mostly all running ARM-based processors. At this stage, few local Australian retailers seem to have caught on, but the online market is booming.

So far, you'll find these computers in three main form factors: the bare circuit board, à la Raspberry Pi; the USB stick-style mini PC; and the Apple TV-esque Android TV console box. Most are effectively the bones of low-cost Android tablets without the touchscreen, but don't let the size fool you – they're typically equipped with the Android 4.0 OS, 802.11g or n Wi-Fi networking and even with just two USB ports, there's enough to begin building a lightweight computer system by just adding a keyboard, mouse and a powered USB hub.

While most use ARM Cortex-A8 processors, you'll find a sprinkling of low-power Cortex-A5 models and, for the first time, new dual-core Cortex-A9-based units. Despite only appearing in May this year, some manufacturers are already up to their fourth generation of these mini PC designs, so it's no place for the slow-minded.

Still, none are what we'd call perfect just yet – each one we tested has an issue or two. But with a growing global community behind them, what the manufacturers don't get right with these devices the community is often working hard to fix. Some now support external booting with Ubuntu Linux.

Sure, they're not going to replace your GeForce GTX 680-powered desktop for speed, but there's one thing all of the models we tested have in common: you can pick up any of them for well under $100.

8/10

CX-01

The smallest USB stick computer around.

www.ebay.com.au @

$50 $

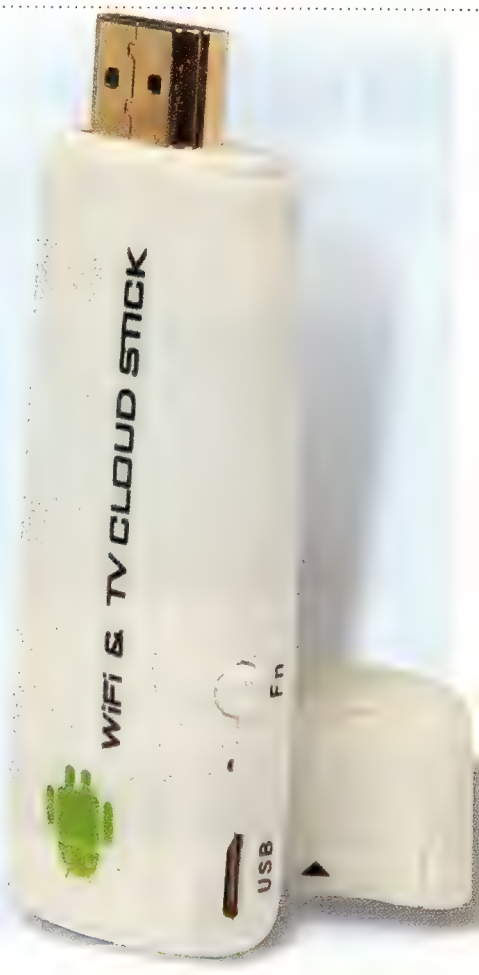
Smallest design so far, efficient Cortex-A5 CPU, 802.11n Wi-Fi. ✔

No microSD card slot, uses HDMI plug. ✖

Android 4.0 preloaded, 4GB flash storage. i

HIGHLY apc RECOMMENDED

The CX-01 mini PC stick hit the market about the same time as the MK802 and the two have been neck and neck for pricing ever since. You'll find this sold for all sorts of prices on eBay, but most savvy buyers should be able to grab it for around $45-$50 (including shipping). This one is less versatile than its sparring partner, with no microSD card slot, but it's actually smaller (if that were possible) and instead of a miniHDMI socket, it gives you a full-size HDMI plug. Unfortunately, what our test unit lacked is the HDMI extension cable many eBay sellers do include, which reduces the weight of the device on the TV or monitor's HDMI socket. It also still needs external power, which can be supplied through either of the two USB ports. The CX-01 is powered by Telechip's 1GHz TCC8920ST ARMv7 processor, however, it's based on the smaller and more power-efficient Cortex-A5 core. You still get a Mali-400 GPU and it comes with Android 4.0.4 with Google Play preloaded on its 4GB of internal storage. Since you get a full-sized USB 2.0 port, you can still build this up into a passable desktop replacement with a powered USB hub. But even with a sizeable 5V/3A power brick, we couldn't get enough power to get our 500GB Seagate USB 3.0 expansion drive to fire up without causing the whole system to crash. Flash drives and USB 2.0 hard drives were fine, however. There's 802.11n Wi-Fi, too, so access to network media files shouldn't be a problem. Unlike most other mini PC sticks, this one doesn't give you root access to its Android 4.0 OS, but there are methods for rooting it online. All up, the CX-01 might be smaller than the MK802, although with less versatility, we'd go the MK802 first.



7/10

DuinoMite Mini

A hobbyist's computer for the price of a music CD.

www.dontronics.com @

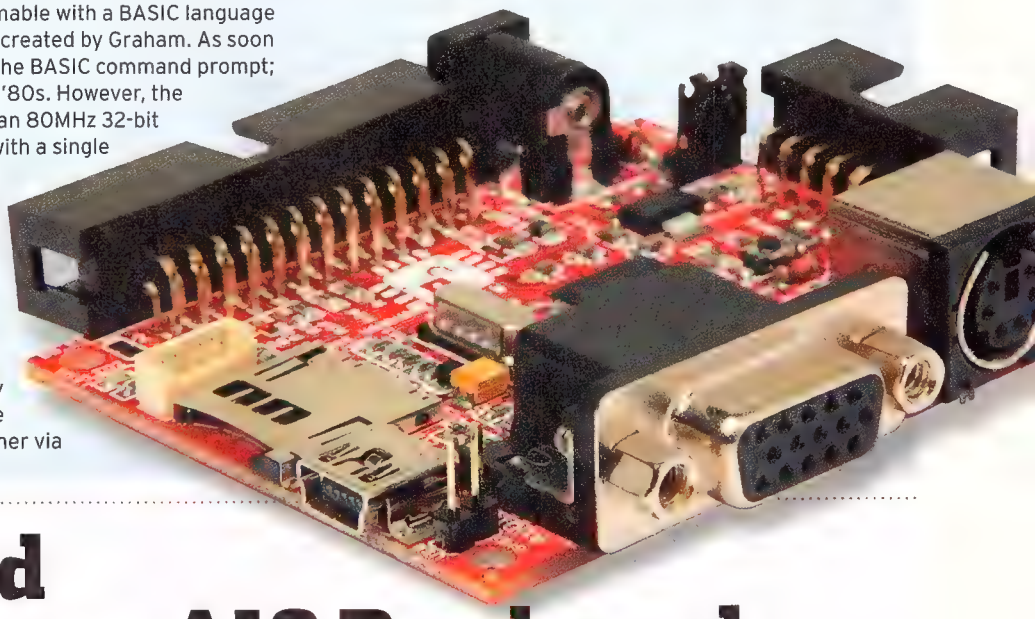
$28 $

Cheap, microSD card storage, VGA output. ✔

Monochrome VGA only, need to update BASIC ROM. ✖

10-pin GPIO, USB OTG port. i

The DuinoMite Mini is about as cheap as you can get for a computer with VGA, a keyboard and microSD storage support. This $28 credit card-sized computer is a clone of Australian designer Geoff Graham's Maximite, modified and manufactured by Olimex (**www.olimex.com**) and distributed in Australia by Dontronics. It's smaller than the Raspberry Pi, but performance is closer to the Arduino than the Pi. However, unlike Arduino, this one features a PS/2 keyboard port, monochrome 480 x 432-pixel VGA output, a USB OTG port and microSD card storage, which supports FAT32. It's programmable with a BASIC language dialect called MM-BASIC, also created by Graham. As soon as you power it up, up comes the BASIC command prompt; it's a bit of a throwback to the '80s. However, the DuinoMite Mini is powered by an 80MHz 32-bit microchip PIC32MX695 CPU with a single MIPS M4K-architecture core, roughly equivalent to ARM's Cortex-M3. It's no Core i5, but for interfacing with real-world technology, the MX695 is potentially more useful, with multichannel 10-bit ADC. The 10-pin GPIO isn't as large as the Raspberry Pi's, but it's still decent for the price and you can power it either via miniUSB or the DC socket with a regulated 5VDC PSU. Our test unit came with MM-BASIC 2.7, but the latest version 4.0 has improvements including procedures/subroutines, sprites and no line numbers if you choose. You can get details on firmware updating the board from **mmbasic.com**. With 3D printers powered by 16MHz 8-bit Arduino boards, don't underestimate what you can do with an 80MHz 32-bit CPU, especially when it doesn't have to run Windows. For homebrew-designed gadgets, a PC that costs less than a music CD is a pretty decent place to start.



8/10

Miniand Hackberry A10 Dev board

A Raspberry Pi on steroids.

www.miniand.com @

$65 $

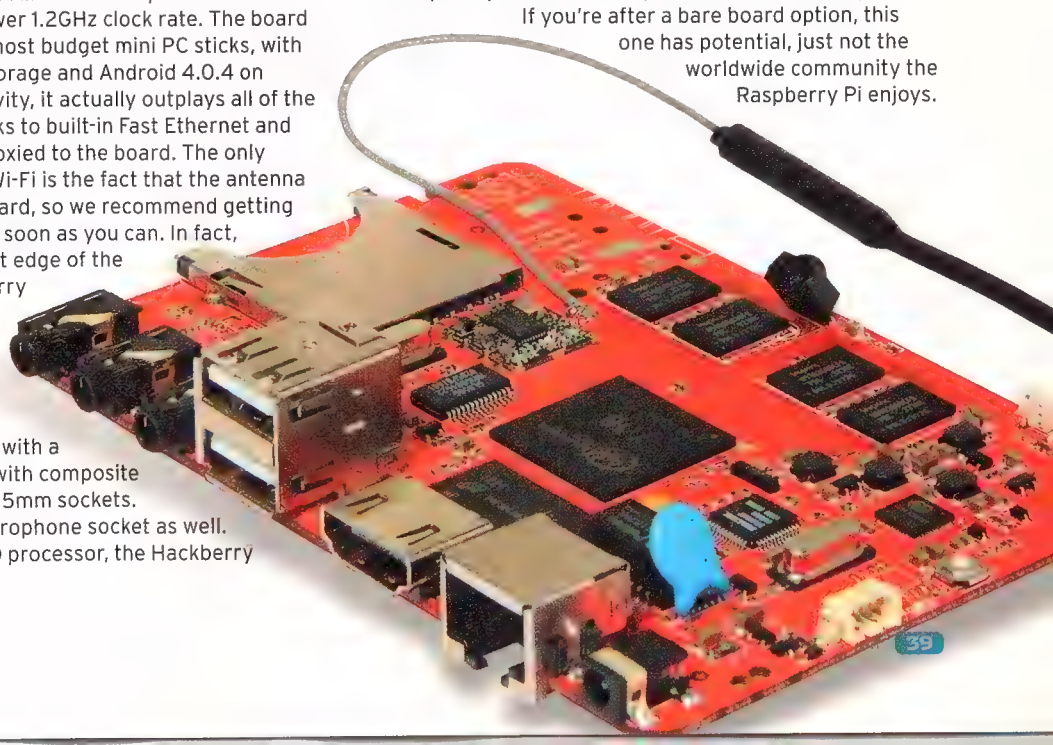
Multiple video outputs, Ethernet and Wi-Fi on board, can be made to boot Ubuntu. ✔

Wi-Fi antenna only loosely soldered (needs case), smaller community than Raspberry Pi. ✖

1GHz Allwinner A10 CPU, 1GB DDR3 RAM, 4GB flash. i

HIGHLY apc RECOMMENDED

Miniand is one of the few local distributors of SBCs and while it offers the Rikomagic MK802 and MiniX Plus from Pineriver, it has a one-off board we've not seen anywhere else. The Hackberry A10 is basically a Raspberry Pi on steroids, featuring the same Allwinner A10 processor as the MK802, but running at a lower 1.2GHz clock rate. The board is pretty similar in spec to most budget mini PC sticks, with 1GB of RAM, 4GB of flash storage and Android 4.0.4 on board. In terms of connectivity, it actually outplays all of the other SBCs we tested, thanks to built-in Fast Ethernet and an 802.11n Wi-Fi module epoxied to the board. The only doubts we have about the Wi-Fi is the fact that the antenna is simply soldered to the board, so we recommend getting the Hackberry into a box as soon as you can. In fact, given the IR LED at the front edge of the board, we think the Hackberry was originally destined for one of the growing number of console-style Android TV boxes such as the Mele A series. It's well featured for video outputs, with a full-sized HDMI port along with composite and component video via 3.5mm sockets. There's a single 3.5mm microphone socket as well. As it runs the Allwinner A10 processor, the Hackberry A10 also has the same bootloader feature to load an OS via SDHC card. So far, there are hacks available to get one of the MK802 Ubuntu ROMs to load, but while Miniand has a committed community supporting its products, it's not Raspberry Pi size, so things happen at a slower pace. If you're after a bare board option, this one has potential, just not the worldwide community the Raspberry Pi enjoys.



7/10

MK808

Truckloads of speed, with a new ROM.

www.ebay.com.au @

$70 $

Dual-core Cortex-A9 CPU, Android 4.1 preloaded, 8GB onboard flash. ✔

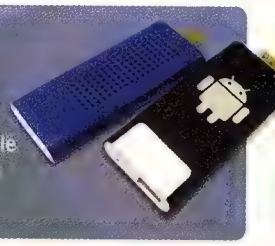
ROM locked to 1,024 x 720 pixels, no Linux support. ✖

802.11n Wi-Fi, microSD card storage. i

The MK808 is a bit of a milestone: it's the first dual-core Cortex-A9 mini PC, with Android 4.1 ready to go. It's powered by Rockchip's new RK3066 dual-core ARMv7-grade CPU clocking at 1.2GHz with 1GB of DDR3 RAM and 8GB of onboard flash. Unfortunately, the Jelly Bean ROM used here has a rushed feel to it. For starters, the screen resolution is set to 1,024 x 720 pixels for some dopey reason, instead of 1,280 x 720. It also won't lock into landscape mode, with some apps sending the screen into a horizontal portrait mode that forces you to bend your head 90°. At the time we purchased our test unit, the MK808 had only been on sale a few weeks and these issues require a new kernel update to fix. While rumours are there's one on the way, it hadn't been released by the time of our testing. The current ROM isn't rooted, but root instructions exist online. Unlike the MK802, however, there are no Linux ROMs available, so despite having a microSD card slot, you can't boot up from it. And what's more, Rockchip isn't generally known for its Linux support, so there are no guarantees here either. Otherwise, the MK808 works well. In fact, it's pretty damn quick. Looking at the benchmark tests, it's anywhere between three and four times faster than most of the Allwinner A10-based models. For a PC stick that's now available for less than $70 on eBay, that's impressive. Basically, if it wasn't for the ROM, this would be an Editor's Choice winner, no question. But until the Jelly Bean kernel is fixed and a fresh ROM released, we think the MK802 is just easier to deal with.

QUAD-CORE MINI PCs ARE COMING!

To give you an idea of just how fast this market is moving, the first single-core USB stick computers were announced in May this year, dual-core models appeared in August and now the first quad-core mini PCs should hit in the first week in November. This new model is expected to be the Hiapad HI802 (what is it with this model number?), featuring Freescale's i.MX6 quad-core Cortex-A9 processor. While we know what they look like, we don't know too much about what's inside, other than it'll be an HDMI plug type stick with 802.11n Wi-Fi plus Bluetooth and include two USB ports plus microSD card storage. Rumour is that the price could just sneak under the $100 mark.



SINGLE-BOARD COMPUTERS UNDER $100

Model	CX-01	DuinoMite Mini	Hackberry A10	MK802	MK808	Raspberry Pi
Price	$45	$28	$65	$49	$69	$41
Processor	1GHz Telechips TCC8920ST	80MHz Microchip PIC32MX795	1GHz Allwinner A10	1GHz Allwinner A10	1.2GHz Rockchip RK3066 (dual-core)	700MHz Broadcom BCM2835
ARM core	Cortex-A5	MIPS	Cortex-A8	Cortex-A8	Cortex-A9	ARM11
ARM architecture	ARMv7	MIPS M4K	ARMv7	ARMv7	ARMv7	ARMv6
Overclockable	No	No	No	No	No	Yes (1GHz)
GPU	ARM Mali-400	None	ARM Mali-400	ARM Mali-400	ARM Mali-400MP	VideoCore
RAM	512MB DDR3	128KB	1GB DDR3	1GB DDR3	1GB DDR3	256MB DDR
Installed OS	Android 4.0.4	None	None	Android 4.0.3	Android 4.1	None
External OS support	None	MM BASIC	Ubuntu 12.04	Ubuntu 12.04	None (to-date)	Debian Wheezy
Internal storage	4GB	(user supplied)	(user supplied)	4GB	8GB	(user supplied)
External storage	None	microSDHC	SDHC	microSDHC	microSDHC	SDHC
USB ports	2	1	2	2	3	2
Video output type	HDMI (plug)	VGA	microHDMI	miniHDMI	miniHDMI	HDMI
Cable supplied	No	No	No	Yes	Yes	No
Wi-Fi	802.11b/g/n	None	802.11b/g/n	802.11b/g	802.11b/g/n	None
Ethernet	No	None	Yes	No	No	10/100
GPIO bus	No	Yes	No	No	No	Yes
BENCHMARK RESULTS						
GLBench 2.1 Egypt (frames/fps)	1,484/13	N/A	766/6.8	1,148/10	6,069/54	N/A
AnTuTu 2.9.3	2,192	N/A	2,569	2,896	6,765	N/A

9/10

Raspberry Pi

The super-cheap computer flag-bearer.

au.element14.com @

$41 $

Cheap, supports 1080p screen resolution, massive community behind it. ✔

No onboard storage, uses older ARMv6 architecture. ✖

Fast Ethernet, GPIO, HDMI and component video out. i

The Raspberry Pi has sparked everyone's imagination with the amount of horsepower this tiny board manages to deliver for its price tag. Despite its meagre 700MHz ARMv6 Broadcom BCM2835 media applications CPU, it's quickly developed into a highly modifiable SBC capable of hitting 1GHz, playing 1080p H.264 video over HDMI and running Debian-based Linux. The board comes with only two low-power (140mA polyfuse-limited) USB 2.0 ports, so a powered USB hub is a must. There have also been issues combining some USB hubs with the Pi's USB-based onboard Ethernet, but otherwise it's generally been a solid performer. Arguably its biggest weapon is the massive community built up around it, which has helped overcome early teething issues. The community-created Raspbian (Debian Wheezy) Linux distro is now the official release and it's getting decent FPU performance out of the Pi's ARM11-based core, meaning the fact that this ARMv6-class architecture can't run Ubuntu isn't a huge loss. What's been more of an issue is having only a fixed 256MB of RAM. However, just as we went to press, the Raspberry Pi Foundation announced that all new Model B boards (the standard model) shipped from October 15 would come with 512MB of RAM. Combined with the new factory-backed 1GHz overclock mode, it should see these new Model B boards really step up in performance. The Pi has a substantial GPIO, but it surprisingly lacks ADCs, which is a drawback for some external electronics applications. But despite the onslaught of USB stick mini PCs, the Raspberry Pi continues to make good and lead the pack. If you're ready to let your inner geek loose, the Pi is a heap of fun and the community support behind it is one compelling reason to jump on board.

8/10

Rikomagic MK802

The original and most versatile USB mini PC.

rikomagic.com/en @

$49 (eBay) $

Fast 1.5GHz ARMv7 CPU, Android 4.0.3 preloaded, boots Ubuntu via microSD card slot. ✔

No ESD protection on HDMI, no power management for CPU. ✖

1GB RAM, 802.11b/g Wi-Fi networking. i

This was the original USB stick-style mini PC and it set off what's become a low-cost computing revolution. It packs Allwinner's A10 ARMv7 CPU at a hefty 1.5GHz, 512MB or 1GB of DDR3 RAM (depending on the model) and 4GB of flash storage. The MK802 not only has Android 4.0.3, but thanks to its microSD card and a very accommodating bootloader, you can run Ubuntu 12.04 via an SD card or pull it out and boot back up into Android. That makes this one of the most versatile mini PCs around. The only problem is the A10's Mali-400 GPU lacks acceleration under Linux. Still, it has built-in 802.11b/g Wi-Fi and a miniHDMI output. Power is supplied via miniUSB while the Type A port will handle a standard wired keyboard and mouse. There's no ESD protection on the HDMI port and no power regulator for the A10 CPU; that said, we've used it for weeks now with no issues. This initial release has been superseded by the MK802+ with N-grade Wi-Fi, a third-gen MK802 II that adds in the missing ESD and power protection, and a newly announced MK802 III that replaces the Allwinner A10 with Rockchip's dual-core RK3066 CPU. However, latter designs have an HDMI plug instead of a socket. You don't want to load too much weight on your TV or monitor's HDMI socket with a computer hanging off the back, which is why we prefer socketed options like this. Being a single-core Cortex-A8 design, it's faster than the 1GHz Telechips TCC8925 Cortex-A5 inside the CX-01. We also had no trouble getting a 500GB portable hard drive recognised by Linux and Android. Look hard enough on eBay and you'll find this for as little as $41, which makes it a steal.

COMMUNITY ROMs

While you shouldn't have permanent issues using community-based ROMs on external storage (like microSD cards on the MK802, for example), we'd be careful installing ROMs onto a device's internal storage. Unless you know the ROM specifically works with your device, you may brick it. Sure, they're not expensive, but we'd strong suggest taking a softly, softly approach to community ROMs until you're confident they'll do what you expect.

BUILDING YOUR SUPER-CHEAP PC

There are numerous ways you can build up your super-cheap computer into a full desktop replacement. Darren Yates explains how.

The market in low-cost ARM-based computers is taking off and turning them into simple lightweight desktop PCs is one of their great appeals. But depending on the model you purchase, you may need more or less in extra parts to get them up and running.

FORM FACTOR

As we've mentioned in the roundup on page 38, there are three main designs available: the barebones circuit board style of the Raspberry Pi, the USB-style form and the Apple TV design of Android TV console boxes. Of the three, the console boxes are the best equipped to form a simple desktop replacement, mainly because they have just about everything you need, including USB ports, HDMI output and their own power supply.

The USB stick-style mini PCs are easily the most popular and other than the Raspberry Pi, they're the ones most likely to be found under $50. The key here is that while they invariably have an HDMI-based output, they're short on USB ports with generally just one standard Type A port available.

The barebones circuit boards typically offer the best features-per-dollar rating, but they usually require more work to turn them into usable systems.

SETTING UP USB & POWER

Despite the different form factors, they all generally have similar setup requirements. The two key extras you need to supply are power and peripheral interconnects. Just about all of the mini PCs we've seen give you at least two USB ports, but the tiny USB stick mini PCs will only give you one standard Type A port – any others will be miniUSB size. Basically, it means you'll need to add in a powered USB hub to add any extras you want, and it can also be where the fun and games begin as you try to power everything.

Beware the power requirements of USB-powered hard drives.

Some micro PCs will include a PSU, but even if you do get one, assume it will only be a 5V/1A type, which is only enough to power the mini PC itself, not all your peripherals.

From our testing, most mini PCs consume around 500-800mA. If you're happy to use a wireless keyboard/mouse combo like Logitech's K700, a 5V/1A PSU is probably all you need. Just plug the tiny USB transceiver into the mini PC's Type A USB port, connect the PSU to the miniUSB port and you're done.

However, if you're adding a USB keyboard, optical mouse and a bus-powered USB hard drive, my experience is that you'll need a 5V/3A PSU and even then, there are no guarantees. While USB flash drives pose a minimal load on the PSU, it's bus-powered USB hard drives that can cause issues.

The latest USB 3.0 standard now allows compliant devices to pull up to 1.5A of current from a single port and we found we couldn't power up the CX-01, a Microsoft 600 USB keyboard, Logitech wireless mouse and a 500GB USB 3.0 Seagate expansion drive on a 5V/3A switch mode brick. As soon as we plugged the drive in, the CX-01 went catatonic and rebooted. By replacing the drive with a 320GB USB 2.0 model, the problem was fixed.

The more reliable option is to give your mini PC its own 5V/1A PSU and run your powered USB hub off its own 5V/2A or 3A PSU. That way, should the hub's USB PSU be overloaded, it won't pull down your mini PC along with it.

A decent 5V/3A power brick is a must-have.

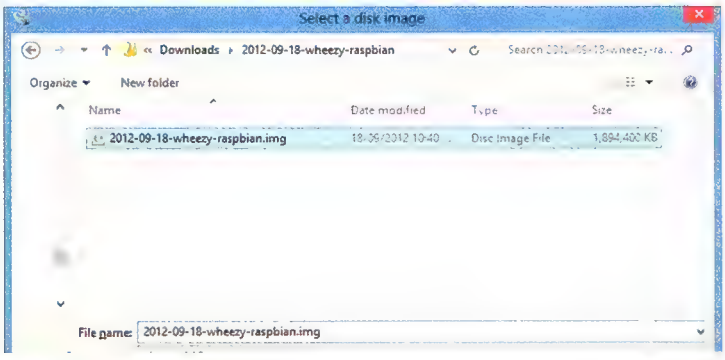
This $10 USB hub worked on all our review SBCs except the Raspberry Pi.

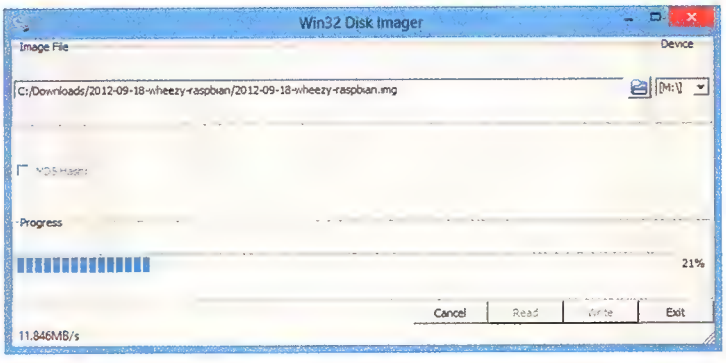
ANDROID ISSUES

The majority of devices you'll find on the market have Android 4.0, although one or two will still have Android 2.3, and we'd strongly recommend avoiding these. While significant improvements have been made over the six months these devices have existed, you'll likely find a couple of niggles you'll need to deal with.

The main issue will likely be screen resolution. While the device may output an HDMI signal up to 1080p/60Hz, you'll typically find the actual app window will be fixed to 720p resolution by the manufacturer to give better performance. It's set in the Android kernel, which means you'll need to flash the device with a 1080p ROM (if it's available), whether that's Android or an alternative Linux/Ubuntu ROM instead. That said, the CX-01 allowed a full 1080p resolution mode, although it

CREATE A RASPBERRY PI BOOT SD CARD





01 Download Win32DiskImager from **tinyurl.com/cz4unw** and grab the latest Raspbian Wheezy Linux distro from **tinyurl.com/6lmsxlq**. Unzip both files to appropriate folders, grab a 2GB or larger SD card, plug it into your PC and fire up Win32DiskImager's .EXE file.

02 Select the .IMG file from the unzipped Raspbian download, choose the drive letter for your SD card and click 'Write'. Once it's complete, you can plug the card into your Raspberry Pi, boot up and follow the prompts. (The initial boot will expand the distro to use all of your card's storage space.)

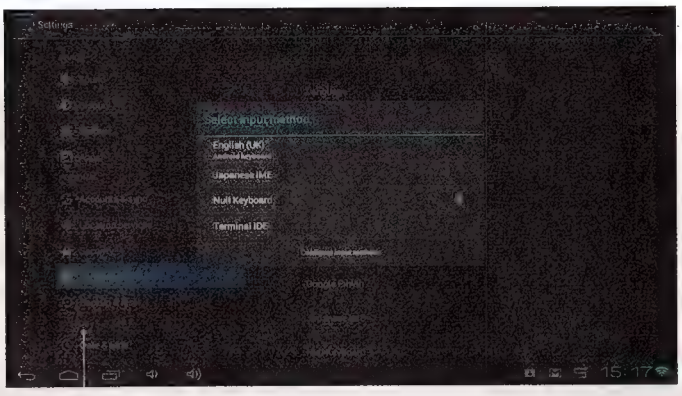
Logitech K700 wireless keyboard

None of the mini PCs we tested this month include Bluetooth and as far as we're aware, Bluetooth driver support isn't guaranteed. We purchased this Logitech K700 for just under $30 on eBay and had it working on all three USB stick-style micro PCs from our roundup. It comes with a tiny USB transceiver, which you simply plug into the mini PC or a powered USB hub connected to it. There are no drivers to worry about – it just works (make sure the USB transceiver is plugged in before you turn on the mini PC). The keyboard itself features a notebook-style trackpad plus a left mouse button that you can operate with your left thumb. Unfortunately, the keys aren't full travel and feel a little bit clunky to press. However, if you're happy to use either internal or network storage, you can plug the USB transceiver into the back of the mini PC and forget about a powered USB hub altogether. Power from two AA batteries means they're easy to replace and it works with NiMH cells, too. All up, the Logitech K700 feels a bit like $28, but it'd be a pity to spend more when the PC will likely cost you less than $50.

was definitely the exception to the rule.

The other niggle is likely to be the Android touchscreen keyboard appearing on the screen whenever you try to type something. Usually, there'll be two ways to fix this. First, check to see if your device has what's called a 'null keyboard' option built in. In Android, head to 'Settings > Language & Input' and in the 'Keyboard & Input Methods' list and look for a 'null keyboard', which is basically just a stopper for the onscreen keyboard. The other option is to head over to Google Play and download the Null Keyboard app, which does the job nicely.

We just need to issue a warning at this point – nasty keylogging apps could also masquerade as null keyboards. Keyloggers record what you type (such as credit card and bank account details) and send the data to a third party. If a null keyboard app asks for internet access when you go to install it, give it a miss. Our tip is to read through the user comments of any app before you commit, and only install apps that get the thumbs up and have a decent install base.



A null keyboard app will turn off the onscreen option.

MUST-HAVE TINY PC APPS

Building a micro PC isn't hard work, but you'll need some apps to finish the job. Darren Yates reveals the essential single-board PC apps — and they're all free.

Most micro PCs come with Android 4.0 for the OS, but the quality of the bundled apps can be a bit mixed. You'll also likely find a number of Chinese-focused apps that may be irrelevant to you. While they're easy to remove (head to 'Settings > Apps'), you'll likely need some replacements to get you up and running. We've come up with a must-have list to fill the gap – these are the apps that go onto our own single-board computers (SBCs). They're free and cover all the basics you'll need for a simple desktop replacement system. These Google Play-sourced apps should work on any Android 4.0-based mini PC.

LINUX DISTROS FOR THE MK802
Lubuntu 12.04:
512MB RAM/1080p video:
512MB RAM/720p video:
Note: The password on the Miniland Linux distros is miniland

HOME OFFICE

- **Kingsoft Office:** The best of the free office suites we've found, able to create Word documents and Excel spreadsheets. It lacks fonts (you can buy these as optional extras), but for lightweight work, it'll get the job done.
- **Dropbox & SugarSync:** Add these to your Google Drive account and you'll have 12GB of free cloud storage to play with. Both of these will also sync to your Windows PC.

INTERNET APPS

- **Lookout Security:** The essential Android security app. Get it. Don't argue, just do it.
- **Google Chrome:** Better than the default browser and it has better integration with Google Docs and Drive. Chrome requires Android 4.0, but be warned that some SBCs (such as the MK802) can't see it on the Play Store.

MULTIMEDIA

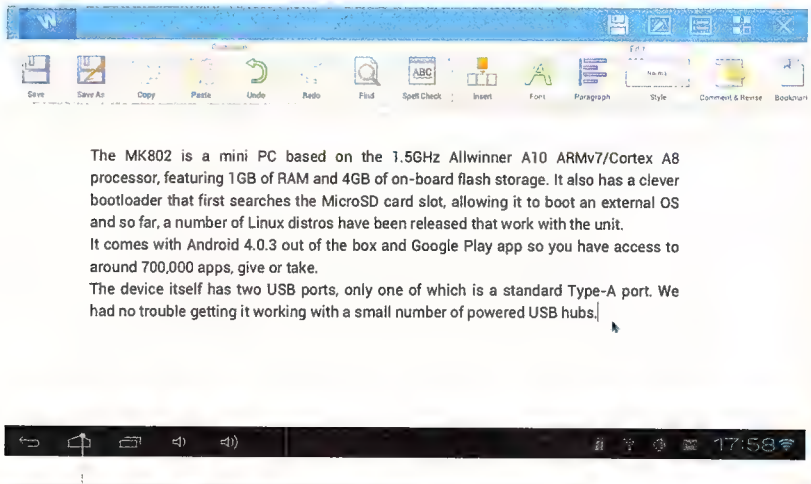
- **MX Player:** The best media player we've found on Google Play. It has file association for easier playback plus screen aspect ratio changing, which is a neat extra.
- **MX Player ARMv7 codec pack:** Add this and your micro PC will play almost any video file you could want.
- **Media Server:** We looked at this last month (see *APC* November, page 115), but it'll turn your micro PC into a DLNA server, meaning your media files will be accessible from your PS3, Xbox or Windows Media Player software.

SYSTEM UTILITIES

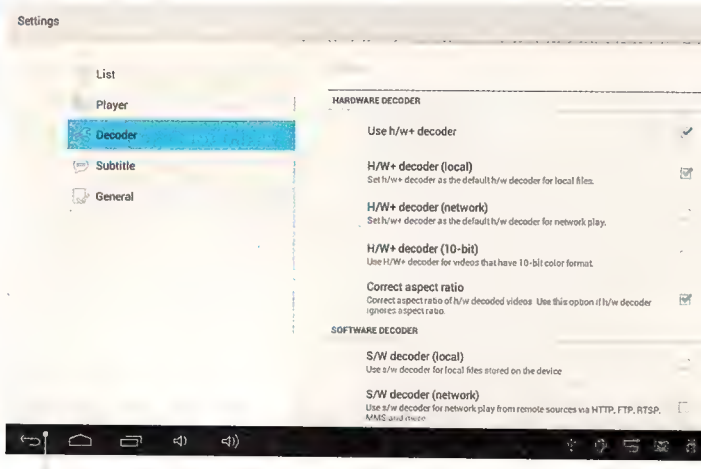
- **Null Keyboard:** A must-have to remove the onscreen keyboard when you're using a real one.
- **ES File Explorer:** Arguably the best file manager on Android, it has networking built in and can access shared folders on your Windows PC.
- **Samba Filesharing:** Allows you to share files with your Windows PCs.

As you'll find with smartphones and tablets, not all Google Play apps work on micro PCs. For example, a quick check showed TweetDeck and Twitter apps can't be installed on the MK802. However, you can still access these services through the normal web browser interface.

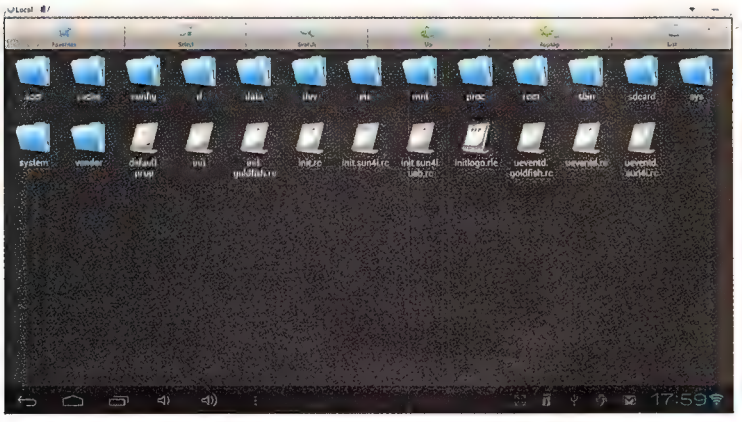
Unfortunately, the whole app install permissions setup is a bit of a dog's breakfast, but with almost 700,000 apps available, it's likely just a matter of looking for something similar to plug any gaps in your arsenal (in the case of TweetDeck, try Seesmic instead). This is one of the reasons why we also recommend you ensure that any micro PC you choose has at least Android 4.0, rather than Android 2.3 – it should give you greater app compatibility.


Save
Save As
Copy
Paste
Undo
Redo
Find
Spell Check
Insert
Font
Paragraph
Style
Comment & Revise
Bookmark
The MK802 is a mini PC based on the 1.5GHz Allwinner A10 ARMv7/Cortex A8 processor, featuring 1GB of RAM and 4GB of on-board flash storage. It also has a clever bootloader that first searches the MicroSD card slot, allowing it to boot an external OS and so far, a number of Linux distros have been released that work with the unit.
It comes with Android 4.0.3 out of the box and Google Play app so you have access to around 700,000 apps, give or take.
The device itself has two USB ports, only one of which is a standard Type-A port. We had no trouble getting it working with a small number of powered USB hubs.
17:58

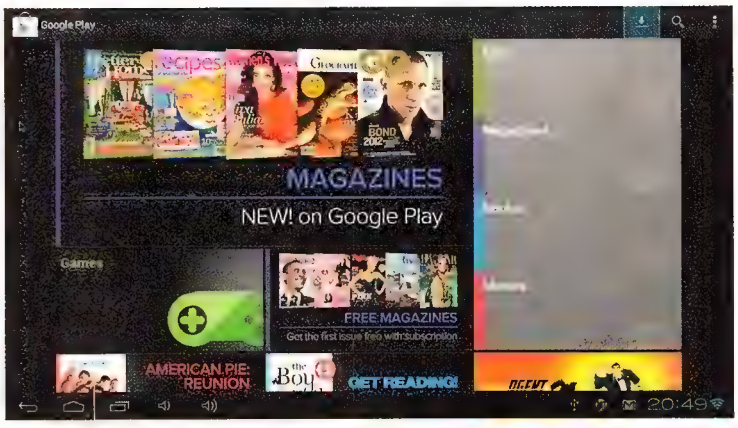
Kingsoft Office, a popular free Microsoft-compatible office suite.


Settings
List
Player
Decoder
Subtitle
General
HARDWARE DECODER
Use h/w+ decoder
H/W+ decoder (local)
Set h/w+ decoder as the default h/w decoder for local files.
H/W+ decoder (network)
Set h/w+ decoder as the default h/w decoder for network play.
H/W+ decoder (10-bit)
Use H/W+ decoder for videos that have 10-bit color format.
Correct aspect ratio
Correct aspect ratio of h/w decoded videos. Use this option if h/w decoder ignores aspect ratio.
SOFTWARE DECODER
S/W decoder (local)
Use s/w decoder for local files stored on the device
S/W decoder (network)
Use s/w decoder for network play from remote sources via HTTP, FTP, RTSP, MMS and more

MX Player offers hardware-accelerated video playback and a mountain of codecs.



ES File Explorer not only explores your device, but networked Windows PCs as well.



Without this app, things would get dull quite quickly...

An early build of XBMC for Android on the MK802 – almost, but not quite ready.

LINUX INSTALLATION

If you're ready to give Linux a go on an Allwinner A10-based device, you'll have a choice of distros. Follow the same step-by-step process in the setup guide for the Raspberry Pi (see page 43 in this issue), but replace the Raspberry Pi .IMG file with the one for your A10 Linux distro. Once the write process is finished, grab the microSD card, turn off your A10 device, plug the card in and power it back up. The A10's bootloader looks to the microSD card slot first before heading to internal storage and will boot up a suitable OS if it finds the relevant boot block on the card.

If you're given the choice of 512MB, 1GB or 2GB of RAM in your dream micro PC, always go for the larger amount – you can't upgrade the RAM later, so whatever you get has to last you. Still, given that at this stage only single-core ARMv7 processor-based micro PCs will run Linux, we'd recommend sticking with either Lubuntu, the distro based on the LXDE desktop environment, or go for Xubuntu, built on Xfce. Just a word of warning: the Xubuntu distro is 1.6GB, while the Lubuntu download is around 300MB.

We've given you links to four different Lubuntu options in the box opposite, with different combinations of RAM and desired video output resolution. Note that while the higher-resolution versions look better, they also use up a bit more CPU juice to run, so things will generally be a little slower. Make sure you choose the right RAM version for your device, otherwise you may get a garbled display.

EXPANDING THE DISTRO

While getting a Linux distro onto your microSD card inside Windows is pretty straightforward, these distros are set to a fixed card size (usually 4GB) and on their own they won't expand to use any remaining storage. (Given that 8GB microSD cards are so cheap, it's not usually worth going any smaller these days.) However, you can fix this by loading the card in an existing Linux computer and using the GParted partition editor. Unfortunately, you can't resize the microSD card while it's running inside your micro PC – GParted can't change the drive partition size while you're still using it.

LINUX OFFICE

Lubuntu gives you access to the Ubuntu online repository so you have a truckload of software you can install. The one we'd go for immediately is LibreOffice. Launch the LXTerminal from the menu and type the following:

```
sudo apt-get install libreoffice
```

It'll take about 120MB of downloads, but you'll get a full Microsoft Office-compatible office suite with more features than you'll find from any Android version and for a nice price (free). In fact, if you want an MK802 to run as a light office computer, this'd be the way we'd do it. And even the Logitech K700 wireless keyboard works. Sweet!

MALI-400 GPU DRIVERS

The main drawback to running a serious Linux system on an Allwinner A10-based mini PC is the lack of GPU acceleration. At this stage, ARM appears not to have released driver details to open source, so while there are Linux distros available, none will have video acceleration. Running the default Android 4.0 OS, the MK802 has no trouble playing back 1080p H.264 video from an external drive. However on Linux, you'll be lucky to get VGA resolution playback at decent frame rates.

One of the big media projects progressing with these devices in mind at the moment is XBMC for Android. So far, there are early alpha releases available and from our testing, it looks remarkably good. We've installed it on the MK808, had it auto-launching on system boot and remote-controlled using an HTC Desire smartphone. While it will play DVD-resolution video, even the dual-core RK3066 CPU struggles with anything beyond that without Mali GPU acceleration. However, since it's just a case of interfacing the XBMC code with existing Mali Android drivers, it should eventually happen.

If you want XBMC on Linux running one of these devices, Raspbmc on the Raspberry Pi is your best bet.

TEST RESULTS: RASPBERRY PI MK1 VS MK802

The last time we had the opportunity to benchtest these two SBCs, we didn't have the space to include the MK802/Lubuntu results. So we benchmarked them again, using the simple Pi to 3,000 places test:

```
Time echo "scale=3000;4*a(1)" | bc -l
```

The best time we got from the Pi was 56.06 seconds (lower is better), overclocked to 900MHz and running our APC pi.linux distro. The MK802 running the 1080/720p Lubuntu distro came back in 43.7 seconds.

BUILD A MINI MEDIA CENTRE

Android-powered micro PCs have enough power to play 1080p H.264 video. Darren Yates explains how to get your videos played to and from anywhere on your home network.

One of the obvious applications for a micro PC is to turn it into a compact, quiet video player. The fact that most also include at least 802.11g Wi-Fi networking means you can have it work almost anywhere in your home without having to worry about wired connections. But if your mini PC also has root access, you can turn it into a tiny wireless video server. And it can all be done for free.

VIDEO PLAYBACK

Having a mini (and importantly, silent) PC you can plug into your monitor or TV that costs less than a tank of petrol is pretty impressive. While most mini PCs will include some form of video playback app, we think you can improve on the default apps in most cases by installing three free apps from the Google Play Store: ES File Explorer, MX Player and the MX Player ARMv7 codec pack.

MX Player is our favourite video player, not only because it comes with excellent codec support, but because it supports file association. This is important because you can set it up so it becomes the default playback option for a wide array of video formats. It can also make use of whatever hardware video acceleration support your device has.

And this is something you need to remember – your mini PC's ability to handle 720p or larger-framed video files will be largely dependent on its hardware video acceleration. For the most part, that will likely mean H.264 codec-based videos only. Without acceleration, playback of other 720p/1080p formats will be dependent on the CPU itself having sufficient speed to software decode the video. That said, with quad-core mini PCs not far away, this may become less of a problem as these devices increase in CPU power. Still, it's something to be aware of at the moment.

EXTERNAL STORAGE PLAYBACK

MX Player alone is enough to play videos from your device's internal storage, a microSD card (if available), and even USB flash and hard drives. One thing that's worth pointing out is support for NTFS-formatted hard drives. We found the MK802, CX-01, MK808 and Hackberry A10 mini PCs all happily handled NTFS-formatted drives, thanks to its inclusion in Android, starting from Android 3.1. It's yet another reason why you need to go for Android 4.0-based mini PCs and avoid those that are still running Android 2.3 (they're out there).

However, having the Wi-Fi adapter built into the device provides a great opportunity to stream your movies to your mini PC from another PC or networked storage device. And that's where ES File Explorer comes in. It has built-in Samba support to allow its Linux kernel to talk to Windows shared folders across your home network, and that includes streaming movie files.

The simplest way to get this working is to simply put your movies into the \users\public\public videos\ folder on your Windows PC, which is accessible from within ES File Explorer. We've tested this on Windows 8 and it works well.

VIDEO SERVING

The other side of the coin is not using your mini PC as a video player, but effectively turning it into a mini server. In fact, serving video is easier for your mini PC to handle than playing it because all it has to do is send out data and be able to maintain the transfer rate at above the file's video bit rate, which all of the Android-powered units we tested can do in spades.

You just need one app called Samba Filesharing. We've talked about this one before – it's a simple yet extremely useful little app because it makes your device accessible to Windows computers by converting everything into the SMB/CIFS (common internet file system).

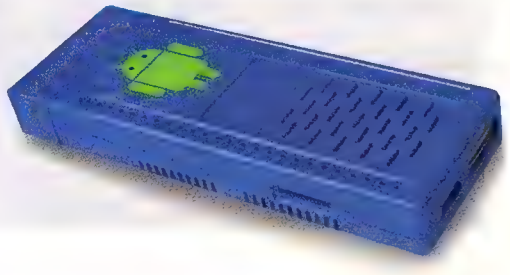
The latest version also supports a second storage device, which means you can share your external USB drive as well. The only problem at the moment is that Samba Filesharing doesn't handle anything other than FAT32, so you're limited to smaller drives and 4GB file sizes. That said, we had the Hackberry A10 quite happily serving video off a 320GB Western Digital Passport Essentials bus-powered drive to our Windows 8 test PC using its Wi-Fi adapter.

The only prerequisite is that your device must have root access – Samba Filesharing won't work without it. Out of the box, this means the MK802 and Hackberry A10 devices only. The CX-01 and MK808 aren't rooted; while you can find details for gaining root access to these two online, it's not a task we'd recommend for newbies.

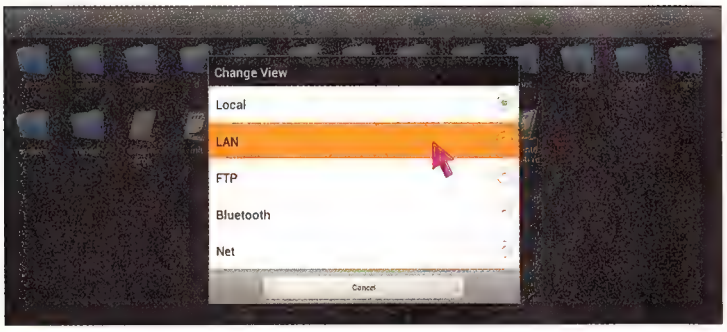
The thing to remember is that while these mini PCs aren't perfect, what you're getting, in many cases, is a Wi-Fi-ready computer for under $50 with access to Android's 700,000-strong app library that can play and serve 1080p-resolution H.264 video. And it's difficult not to find that impressive.

WI-FI CAPABILITIES

While we had no trouble with the Wi-Fi adapters built into any of our test devices, reports online are that another RK3066-powered mini PC, the UG802, gives less-than-brilliant results with its Wi-Fi adapter. This shouldn't be an issue with devices having external antennas, although for smaller USB stick-style mini PCs, it's worth checking online forums before you buy any device, just to be sure.



WATCH NETWORK VIDEOS ON THE HACKBERRY A10



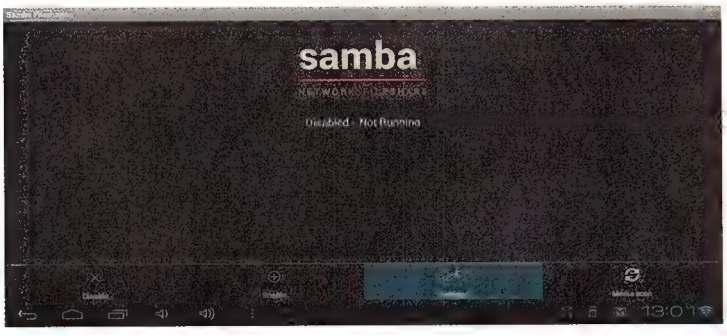
Command Prompt
Microsoft Windows [Version 6.2.9200]
(c) 2012 Microsoft Corporation. All rights reserved.
C:\Users\Darren>ipconfig
Windows IP Configuration
Ethernet adapter Ethernet:
Connection-specific DNS Suffix
Link-local IPv6 Address
IPv4 Address 192.168.0.5
Subnet Mask 255.255.255.0
Default Gateway 192.168.0.1
Ethernet adapter VMware Network Adapter VMnet1:
Connection-specific DNS Suffix
Link-local IPv6 Address
IPv4 Address 192.168.16.1
Subnet Mask 255.255.255.0
Default Gateway
Ethernet adapter VMware Network Adapter VMnet8:

01 Fire up your mini PC and install ES File Explorer, MX Player and the MX Player ARMv7 codec pack. Launch ES File Explorer, click 'Local' at the top-left and choose 'LAN'. Click the 'New' button on the menu and select 'Scan'.

02 Locate your PC via its IP address (if don't know your PC's IP address, open Command Prompt in Windows, type **ipconfig** , press Enter and search for the IPv4 entry). Locate the 'Public' folder and search for 'Public Videos'.

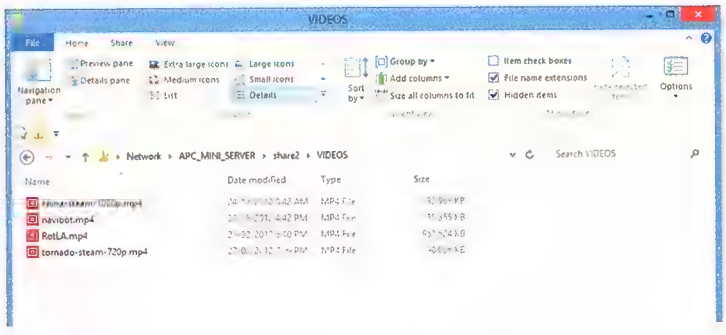
03 Select a file and choose MX Player if you're asked which player you want to use. Your video should begin playing within a couple of seconds.

TURN YOUR MK802 INTO A VIDEO SERVER



01 Fire up your MK802, install Samba Filesharing from Google Play and launch the app. Click the 'Settings' button, represented by three dots in the system tray.

02 When the 'Preferences' screen appears, click in turn on 'Password' and 'Username' to give your server the details you want. After that, click on 'NetBIOS Name' and choose the name you want your Windows PCs to see.



03 Go to 'Other Fileshare Settings > Second Share Folder' and your FAT32 drive should be listed in the box. Select it and click 'OK'. Return to the front screen, click the 'Samba' title and Samba Filesharing will launch its server.

04 On your Windows PC, head to 'Windows/File Explorer > Network' and your server's NetBIOS name should appear. Select it, work through the folders and find a video. It should then begin to play in your chosen player.

1 APC Back-UPS® Pro 1200

The Back-UPS® Pro 1200 is designed to protect home offices and businesses from experiencing the inconvenience and expense caused by power outages. These uninterruptible power supplies (UPS) feature power-saving outlets, which automatically shut off power to unused IT terminals, saving the user money through unnecessary power draw. Additionally, the Back-UPS Pro 1200 features an LCD panel to provide utility indication and have automatic voltage regulation (AVR) bypass capabilities to save energy and extend battery life.

RRP $479 www.apc.com/au

Chris

2 Bamboo Stylus

Bamboo Stylus pocket is an expandable stylus for iPad iPhone iPod Touch Android or other capacitive touch surfaces It's as flexible as your imagination

RRP $38.50

www.buywacom.com.au

Fujifilm FinePix

The Fujifilm FinePix XP150 and XP170 with their rugged design and four-way protection are fantastic for the great outdoors. 10m waterproof, 2m shockproof, dustproof, -10 C freezeproof, 14.0 megapixels, 5 x CMOS sensor, 2.7" LCD, SR Auto XP150-GPS XP170-wifi

RRP $299 www.fujifilm.com.au/tough-waterproof-cameras

Purchase a Fujifilm FinePix XP150 or XP170 between 1/11 and 31/12 and receive an XP styled lilo. Via redemption.

tmas Gift guide

ASUS ET2300

The new ASUS ET2300 10 points capacitive touch All-in-One PC series has a unique double-hinge design that allows it to be used both as a traditional upright display and as a digital canvas that folds flat, parallel to the table top. Powered by the 3rd generation Intel® Core™ i3, i5 or i7 desktop processors, in addition, Intel® Thunderbolt™, Intel® Wireless Display (WiDi), and USB 3.0 provide flexible and future-proof connectivity. Available now at most of the major retailers and authorised resellers

www.asus.com.au

MORE THAN JUST SHARING

If it's time to get serious about your home or office storage needs, a NAS device is the best option. Bennett Ring tests 12 of the latest.

Whether your network is used to transport high-resolution CAD files around your small drafting business, or to shuffle HD MKV movies between your home theatre projector and study-bound PC, a network-attached storage (NAS) device has a range of benefits that can't be accomplished by a mere PC. Unquestionably the biggest benefit of all is data security – cloud storage notwithstanding, there's simply no better way to ensure your precious data remains safe and sound than storing it on a dedicated NAS.

Provided the NAS is configured to use a RAID mode that delivers data redundancy, even if a disk fails, you'll still have an image of your precious ones and zeroes. You'll obviously still need to ensure each device on your network sends a copy of its files to the NAS, but many can be configured to do the job automatically. Simply install the necessary software on each client, run the backup wizard and let the NAS do all the work. The majority of NAS devices don't mind whether it's a Windows or Apple machine they're backing up, with support for Time Machine the norm.

By storing all your data at a central point that's always on, every device in your home will be able to access it 24/7, be it another PC, a tablet or even your smartphone. Accessing these files isn't limited to your local network either, as most NAS devices have recently added external access to their lengthy list of features, providing you with a 'personal cloud'.

As long as your network is connected to the internet, you'll be able to read and write to the NAS device wherever you've got a data connection. You could be on holidays in Thailand, using hotel Wi-Fi to automatically upload every happy snap from your smartphone to the shared photos folder on the NAS device. Or you could be visiting a client in the US, accessing your sizable collection of design documents in real time during a presentation. The possibilities are limited only by your imagination and how functional the personal cloud software is.

When buying a NAS, the most important choice is how big it needs to be, which is measured in two ways: the number of bays or the total storage. Each bay holds a single hard drive and you can buy these prefilled or empty. Bear in mind that 3TB drives are now becoming commonplace, so a two-bay unit can theoretically hold up to 6TB of data if you don't need data redundancy.

Don't buy with an eye on how much data you're using at the moment. With data consumption continuing to grow at a geometric rate, it's wise to double or quadruple today's amount to ensure the NAS device will grow with your needs. Most home users will suffice with a two-bay/4TB unit, while small businesses will find a four-bay/12TB device more suitable for their heavier workloads. Only those with extreme data requirements or sizeable 20+ client networks will require the larger NAS devices with more than six bays.

The same is true of the internal processor – mid to high-end NAS devices come with more powerful processors, while the cheapest have very basic ones. In terms of features, home users should look for media-centric applications such as DLNA and iTunes servers, as well as personal cloud features. Business users will have more specific needs, such as SSH access, iSCSI and NFS compatibility.

Finally, another recent addition to NAS devices is support for apps. On several of the devices we tested, it's possible to download additional functionality from the manufacturer or community, such as video transcoders that allow the user to re-encode videos on the fly for playback on portable devices. While the list of features on the box is important, bear in mind that there may be several applications available for download that aren't listed.

We've taken a look at 12 different NAS devices, focusing on those designed for smaller networks. We used an automated file transfer test to read and write a 1GB file to each NAS. Many of the devices arrived without hard drives, so we used Western Digital's new range of 1TB and 3TB Red hard drives. Designed specifically for NAS performance, they offer respectable speed with an emphasis on longevity and power saving.

6/10

$260

TWO BAYS
2x SATA II 1TB DRIVES
RAID 1 OR JBOD

Buffalo CloudStation Pro Duo 2TB

One for multimedia-loving noobs.

www.buffalo-technology.com

Easy to use, solid multimedia capabilities, decent performance, affordable.

Direct access is limited, smaller feature set, lacklustre backup features.

Some NAS devices are better left to those with a lengthy network experience section on their resume, based on highly technical interfaces laced with jargon. The CloudStation Pro Duo isn't such a device; instead, it's aimed at making the NAS experience idiot-proof. As such it's a great gadget for first-timers, but the move to simplify the experience will probably leave savvy users wanting deeper access.

The biggest difference to other NAS devices is the PogoPlug interface. Instead of directly accessing the NAS menus via a browser pointing to the unit's IP, you're directed to use an external web site, at **cloudstation.pogoplug.com**. Thanks to some very clever software, the setup process automatically ties that page to your particular device. The beauty is that it allows remote access to all of your files through the PogoPlug web site wherever you may be, without needing additional software installed. It's possible to access the NAS device directly through your internal network if you'd prefer, but you'll be required to jump through a couple of hoops to get there. Unfortunately, mapping a network drive to it is a little more painful than usual, requiring the use of specific CloudStation software.

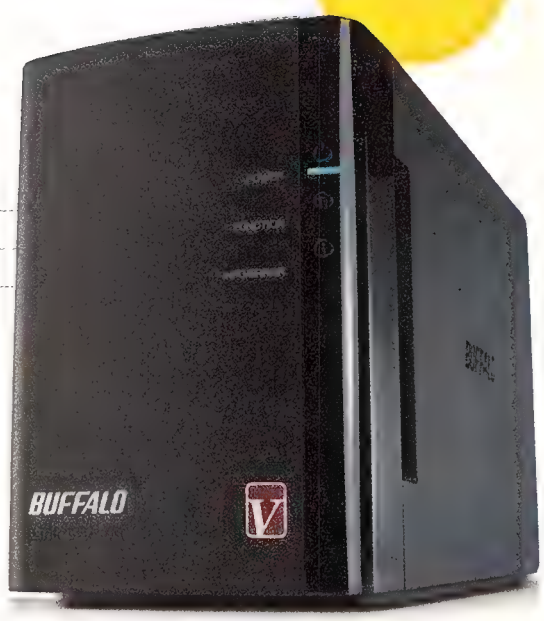
The functionality offered by the Pro Duo is firmly focused on multimedia sharing, also allowing some basic social media sharing of your stored assets to Facebook and Twitter. However, the backup suite is extremely limited compared to other NAS devices, with poor scheduling options. Apple users will appreciate the Time Machine functionality.

A single USB port on the rear allows for printer sharing or external backups, while RAID support across the two bays is also included, allowing you to choose performance or safety. Given the relatively simple hardware, the average performance results were to be expected.

For networking novices, the CloudStation Pro Duo is excellent value at the cost of a relatively limited feature set. If you want an easy-to-use NAS for your home movies, music and photos, this is a great place to start.

7/10

$350



TWO BAYS
2x 1TB DRIVES
RAID 0, 1, NORMAL

Buffalo LinkStation Pro Duo 2TB

An affordable small business solution.

www.buffalo-technology.com

Snappy responsiveness, thorough configuration options, affordable price.

Requires extra software to discover, relatively standard NAS offering.

We wish more NAS makers would provide the default IP and account details in the manual, allowing more experienced users to jump right into the device's control panel via a web browser, but Buffalo just loves to make users install unnecessary software to do this basic step. It's not the only company guilty of this annoyance, so we can't be too harsh, but it'd be nice if it took more seasoned NAS users into account.

Once we'd installed the necessary NASNavigator software and discovered the IP address of the unit, we found a device that aims for a more robust experience than the media-centric CloudStation Pro Duo. It's a two-bay unit that's only slightly bigger than a couple of 3.5in hard drives taped together, so the inclusion of a Marvell 1.6GHz processor is most impressive (the same as that used in the CloudStation). Unlike its consumer-focused cousin, accessing the system's features doesn't require an external web site; instead, it's accessed directly via web browser – the norm for NAS devices.

The interface is one of the easiest we've seen and navigating through the different screens was quite responsive. Backup options were much more thorough than the CloudStation, with the inclusion of NovaBACKUP Professional and Time Machine for Apple. Sharing to the personal cloud isn't quite as smooth as with the CloudStation, with an emphasis on productivity file sharing rather than images or video. As expected, full BitTorrent, iTunes and DLNA support is included, while the single USB port can be used for printer sharing or external backups. Given the slightly higher pricing, we were surprised to see slightly slower performance here than on the CloudStation.

If you're looking for a small, no-nonsense NAS device that can handle your network backups as capably as your file and media sharing, the LinkStation Pro Duo ticks all the usual boxes, without adding anything surprising to the mix.

TWO BAYS
RAID 0, 1
ESATA, USB 2.0

6/10

$250 diskless

LaCie 2big NAS

Aesthetics over functionality.

@ www.lacie.com/au

✓ Sexy aluminium case, looks like HAL 9000, whisper quiet.

✗ Missing several key features, expensive without drives.

It's not that surprising to find a NAS where its biggest strength is its designer aesthetic. Looking like a cross between HAL 9000 and an Apple TV box, the 2big NAS is targeted at those who want to maintain their office's interior design. But is it more than just a pretty face?

Tucked away inside are dual bays stocked with 3TB drives, providing up to 6TB in storage if you're a reckless speed demon. Logging into the interface didn't require any software at all (thanks LaCie!) and the interface loaded incredibly quickly. It seems to be built for 800 x 600 screens, though, cluttering everything into a small window in the centre of our 1,920 x 1,080 screen. Setting up new users and folders is a breeze, as is managing the disk setup (only RAID 0 and 1 are supported).

Most of the basic features are present and accounted for, including rudimentary backup, simplistic power management and a Torrent client. A firmware update is necessary to unlock the new MyNAS personal cloud access, which we found to be very easy to use, albeit with rather average file compatibility. We couldn't find any mention of the ability to back up the NAS to external cloud storage.

Surprisingly, there's absolutely no mention of DLNA support in the specs, but it appears LaCie has relabelled this as 'Multimedia'. Apple fans will be pleased about the iTunes server support, while the eSATA connection is a rare inclusion that power users will make the most of. For a device that looks relatively simple, the inclusion of iSCSI, NFS and AFP support is welcome.

Performance wasn't spectacular, surprising seeing there's a 2GHz processor inside. Considering that this is almost as expensive as other two-bay devices and doesn't even include any drives, we're a little underwhelmed by the 2big NAS. It might look the goods, although there are more affordable options available that outperform this box both in terms of file speeds and features.

8/10

$160 diskless

TWO BAYS
RAID 0, 1, JBOD
MARVELL ARM CPU

HIGHLY apc RECOMMENDED

Netgear ReadyNAS Duo v2

Cheap, but is it nasty?

@ www.netgear.com.au

✓ Very affordable, brilliant UI, excellent personal cloud.

✗ Not the fastest hardware, Genie Apps should be free.

The ReadyNAS Duo v2 is one of the cheapest NASs on the market. So has Netgear had to cut corners to deliver such a fiscally responsible product?

Given Netgear's emphasis on consumer electronics, the easy-to-use interface was to be expected. Users must first install the RAIDar software to get there, but once they're in it's a pleasant place to be. System health is displayed via a sexy graphical representation that makes fan speed, temperature, disk status and the IP address available in just a glance.

In terms of features, the Duo v2 is aimed at basic media sharing and backup duties and we couldn't find any mention of iSCSI support (NFS is included, though). However, the 'Genie Apps' tab is a unique addition. From here users can download different applications that add new features to the device, including real-time transcoding of video to different devices and cloud backups. The only problem is that there are only a few apps and they all cost a few dollars to purchase. We understand that everybody wants to jump on board the app store moneymaking bandwagon, but Netgear should really be opening these up for free access if it wants more than a handful to appear.

A recent firmware update added some of the most comprehensive personal cloud functionality we've yet seen from a NAS, which can automatically sync all of your devices whenever a file is changed, and also offers drag-and-drop functionality. Considering the approachable price tag, the mid-range performance is more than acceptable. A couple of USB 3.0 ports at the rear are welcome additions, along with a standard USB 2.0 input on the front, making external backups to a portable hard drive a single button press away.

Thanks to that firmware update, the Duo v2 has evolved to become a much more potent critter than when it first launched. With one of the nicest interfaces we've used, excellent personal cloud support and good performance, this is one of the better two-bay NAS devices for novices.

ONE BAY

ITUNES, SAMBA AND DLNA SERVER

PERSONAL CLOUD SOFTWARE

6/10

$85 diskless

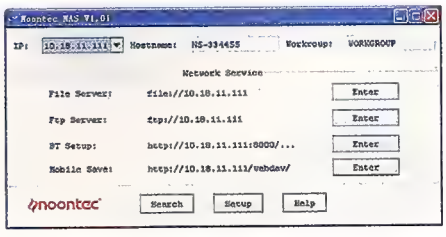
Noontec N5

Mediocre NAS technology.

From a company that makes extremely affordable NAS enclosures, the N5 is one of the cheapest. It's a single-bay device, so there's absolutely no redundancy if everything goes pear-shaped. It's only available in a diskless variant, so you'll need to purchase a 3.5in drive before you can use it. It might be built of cheap plastic, but the simple design is subtle yet slick, built to look like an Apple product. There is just a single USB 2.0 port at the rear, while all of the cooling is handled by a tiny 40mm fan inside the enclosure.

Heading into the interface revealed one of the most unfriendly UIs we've ever seen. It's got all the relevant features a media-focused NAS should include, but finding them and setting them up is harder than it could have been. There are numerous spelling and grammatical errors, and absolutely no descriptive text whatsoever. Experienced network boffins will eventually be able to get it up and running, but those who need handholding will find it a horrible experience.

Given the incredibly low price and minimal hardware specs, we didn't expect blistering performance. However, we also didn't expect it to be quite this bad, at around half the speed of the cheapest two-bay devices. If you're looking for the cheapest, most rudimentary single-bay NAS device around, the N5 fits the bill. However, the lack of data redundancy will turn off most users and for just $60 more you can have a much fuller-featured twin-bay NAS device.



@ www.noontec.com

✓ Extremely cheap, doesn't look too shabby.

✗ Horrible UI, woeful performance, no data redundancy.

With APC Back-UPS, your digital life goes on... even when the power goes off.

Preserve what's most important to you.

Reliable power backup for 24/7 availability

Whether DVRing your favorite show, updating your Facebook status, or playing a live networked game, you depend on your home electronics every day, all day. That's why APC by Schneider Electric has designed battery backup solutions that protect the constant availability and connectivity you expect... and depend on.

Peace-of-mind protection on two levels

When the power goes out, our popular Back-UPS units go to work. They instantly switch your home technologies to emergency power, allowing you to work through brief power outages or safely shut down your systems so you won't lose valuable files—such as digital photos and media libraries. They also feature surge outlets to guard your electronics and data from "dirty" power and damaging power surges—even lightning. So you get two levels of protection in every APC Back-UPS unit!

Energy-saving insurance for what matters most

Our Back-UPS units protect your home office, digital living and home media applications, notebook computers, DVRs, and gaming application. And since we now offer energy-efficient models that reduce electricity costs through unique power-saving outlets, you can realise true energy savings regardless of the applications you're backing up. Throughout your home, the APC Back-UPS is the cost-saving insurance you need to stay up and running and reliably safeguarded from both unpredictable power and wasteful energy drains.

Keep your electronics up and your energy use down!

ES Series

The ever-popular ES models are priced affordably yet provide enough extended runtime to allow you to work through short and medium power outages. Some power-saving models have been designed to actively reduce energy costs.

The energy-efficient ES 700G

The ES 700G boasts innovative power-saving outlets, which automatically shut off power to unused devices when your electronics are turned off or asleep, eliminating wasteful electricity drains.

- 8 Outlets • 405 Watts / 700 VA
- 68 Minutes Maximum Runtime**
- Telephone/Network Protection

The best-value ES 550G

The ES 550 uses an ultra-efficient design that consumes less power during normal operation than any other battery backup in its class, saving you money on your electricity bill.

- 8 Outlets • 330 Watts / 550 VA
- 51 minutes Maximum Runtime**
- Telephone/Network Protection

Power up to WIN 1 of 7 APC ES700G Battery Back-UPS units!*

Visit www.apc.com/promo Key Code 52816K

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*Authorised under NSW Permit No. LTPM/12/00526, ACT Permit No. TP 12/02264. Promotion commences 1st July 2012 and closes 31st December 2012. Full terms and conditions available online. **Runtimes may vary depending on load.

FOUR-BAY NAS DEVICES

8/10

$750 diskless

FOUR BAYS
RAID 0, 1, 10, 5, 5+1
USB 3.0, 2x USB 2.0

HIGHLY apc RECOMMENDED

Iomega StorCenter px4-300d

Everything but the kitchen sink.

@ www.iomega.com

✓ It does everything, excellent performance, robust construction.

✗ Slightly pricey, personal cloud needs work.

This quad-bay NAS device has minimal impact on your fiscal regions, considering the excellent construction. The steel case is very sturdy, while the rugged metal drive bays look like they could handle thousands of hot-swaps without any signs of early retirement. The front face houses a small diagnostic LCD screen and USB 3.0 port, with twin Ethernet and USB 2.0 ports adorning the rear.

A sleek grilled door folds shut over the drive bays. Tucked away inside is a zippy Intel Atom dual-core CPU and 2GB of RAM, delivering excellent interface responsiveness and some of the fastest network performance we recorded in the four-bay category. Heck, any category.

The LCD makes obtaining the StorCenter's IP a breeze, allowing direct access to the device without any software installs. Pointing our browser to the DHCP-assigned IP, we were greeted by one of the better UIs we've seen. A comprehensive online manual explains each and every setting, making this an extremely novice-friendly device, despite having some serious NAS features.

Aimed at both prosumers and small businesses, the feature set is a happy mixture of media streaming, cloud sharing and professional networking features. NFS, iSCSI and AFP are all aimed at corporate users, and they're just a few of the dozens of protocols supported. Basically speaking, if you want it, chances are the px4-300d does it. The cloud backup features will be useful to both home and office users, although the personal cloud features are a little clunky compared to the better offerings.

If you're looking for a four-bay NAS that doesn't scrimp on features or performance, the px4-300d comes highly recommended. It's a little bit more expensive than other four-bay devices, but the excellent hardware and feature set more than justify the price. If Iomega can tidy up the personal cloud software, it'll have all the bases covered.

HIGHLY apc RECOMMENDED

FOUR BAYS
RAID 0, 1, 5
2x USB 3.0, USB 2.0

8/10

$300 diskless

Netgear ReadyNAS NV +2

Here comes another one, just like...

@ www.netgear.com.au

✓ Easy-to-use interface, affordable for a four-bay unit, LCD screen.

✗ Limited apps availability, missing some high-end features.

From what we've seen of the Duo v2, Netgear has the chops to churn out a very respectable NAS device for consumers, and the NV +2 looks to satisfy the same users with even more storage. This four-bay device is intended for slightly more demanding environments and includes the same Marvell 1.6GHz CPU as its little brother. Once again, we see the welcome inclusion of twin USB 3.0 ports at the rear, complemented by a single USB 2.0 port at the front next to a one-touch backup button. An LCD screen also adorns the front, displaying pertinent information such as the unit's IP, health and more.

Unlike other NASs, we performed a firmware update as Netgear had recently released a new version that added comprehensive personal cloud capabilities, exactly the same as its smaller sibling. Heading into the interface reveals a look and feel that's basically identical to its consumer-oriented brethren: clean, simple and easy to use. To be honest, there's nothing here to set the two units apart, other than the option for a RAID 5 hard drive configuration as a result of the quad bays.

Once again we see support for Genie Apps, with just a handful available for use. There's also an 'Add-ons' tab, but their incompatibility with the ARM CPU used here means the majority available for download won't work. Despite Netgear's claims that porting these to ARM would be a simple affair, just one has been ported in the last 12 months.

We expected identical system performance to the Duo v2, so we were very surprised to see this unit perform so poorly. Closer examination revealed our test unit was set up with Netgear's proprietary X-RAID 2 spanning technique, which accounts for the performance drop. Setting it back to RAID 0 should bring the results back to expected levels.

The ReadyNAS NV +2 is simply a four-bay version of the Duo v2. It's exactly twice the price for double the drive bays, so which one you go for will ultimately be decided by how many bays you need.

FOUR BAYS

NAS, ISCSI/ IP-SAN STORAGE COMBO SOLUTION

2x ESATA, 2x USB 3.0

EDITOR'S apc CHOICE

9/10

$820 diskless

QNAP TS-469L

You pay for what you get.

@ www.qnap.com

✓ Includes everything but the kitchen sink, blistering performance, perfect UI.

✗ No LCD screen, high price.

QNAP stands alongside Synology as one of the most respected NAS makers in the business, and from the very first moment we explored the interface it's easy to see why. Without inserting a single DVD or downloading any software online, we were able to detect and connect to the TS-469L directly from the Windows Network Center. A very straightforward wizard walks the user through configuring the basic options: username, password, IP address, RAID selection and the like.

This simplicity flows through to the rest of the interface, despite the fact that it has a much deeper feature set than consumer devices. The Intel Atom D2700 processor and 1GB of DDR3 RAM (upgradable to 3GB) deliver incredibly responsive interface performance, with pages loading as soon as they're selected. Network performance was similarly fast, with the TS-469L posting the fastest speeds of all the device we tested.

Compared to other four-bay enclosures, this is one of the least budget-friendly entrants, but the inclusion of NFS SMB/CIFS, AFP and iSCSI support go some way to explaining the high price tag. SSH access is also provided, without the need to go hunting for a plug-in. There are also twin eSATA and dual USB 3.0 ports for speedy external backups, though the lack of an LCD screen is a surprising omission at this price point. Another nice touch is the ability to mount ISO archives on the device, allowing network installs without requiring the physical disk. Rounding out the feature set are comprehensive media streaming and personal cloud access applications.

The old adage 'you pay for what you get' is never truer than here. While it's probably overkill for most home networks, serious users looking for the most advanced feature set will find the TS-469L hard to fault. Combined with blistering performance, four-bay NAS devices don't get any better than this.

FOUR BAYS

SYNOLOGY HYBRID RAID, RAID BASIC

JBOD, 0, 1, 5, 5+ HOT SPARE, 6, 10

8/10

$472 diskless

HIGHLY apc RECOMMENDED

Synology DiskStation DS413

Affordable yet potent.

@ www.synology.com

✓ Comprehensive feature set, excellent write performance, clear interface.

✗ UI's depth can be overwhelming, plastic construction.

It might specialise in the business end of town, but that doesn't mean Synology has no idea about smaller NAS solutions. The DS413 is a little four-bay beauty that doesn't cost an arm and a leg, yet leverages the company's expertise to deliver an extremely well-rounded device.

Costs are kept low by the simple construction. The entire chassis is built from plastic, including the drive bays, so you'd be wise to treat it with kid gloves. A single eSATA and twin USB 3.0 ports deliver fast external backups, while a couple of diagnostic LEDs on the front provide the most basic of troubleshooting information.

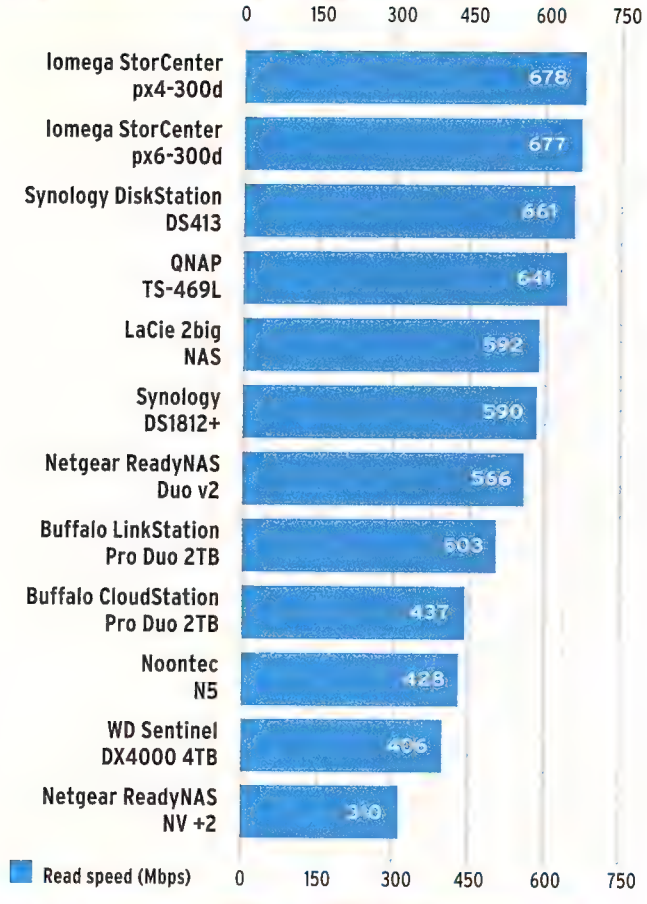
There's no need to install any software to access the DS413 – just point your browser to **find.synology.com** and you'll be whisked through a wizard. The first step of the install is always a download of the NAS firmware, ensuring that the device is always up to date.

Heading into the Synology DiskStation Manager interface reveals a UI that looks much like the Windows desktop, with the system settings displayed in a format that looks identical to the Windows 'Control Panel'. Digging into these reveals some serious NAS services despite the consumer-oriented price, including iSCSI, NFS, SSH, LDAP and AFP support. Backup options are voluminous and additional add-ons bring extra media functionality such as cloud access, as well as iTunes and DLNA servers. While the personal cloud features work well enough, they're not quite as slick as Netgear's efforts.

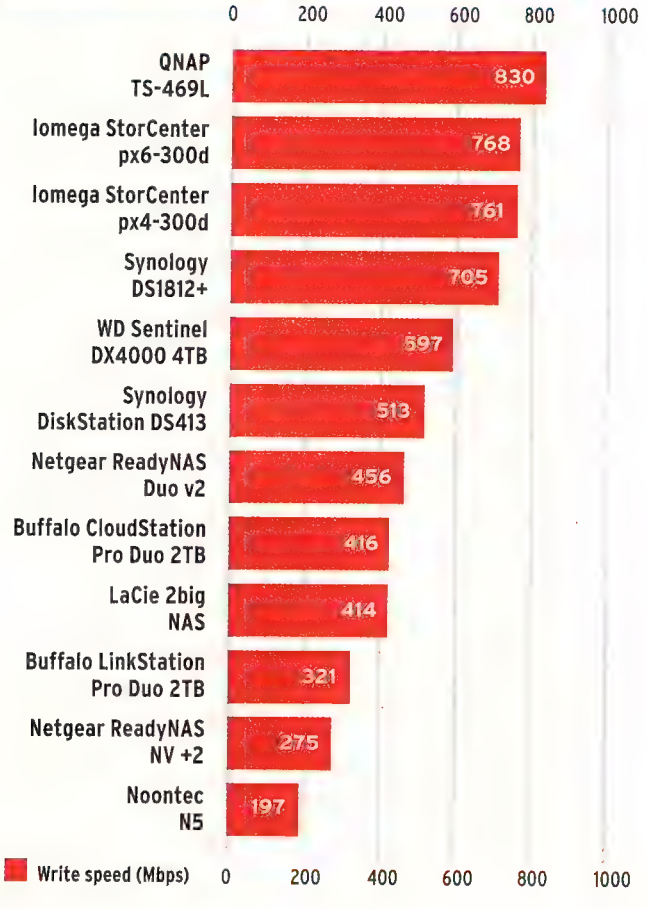
The 1GHz dual-core CPU might not be the fastest, but navigating the comprehensive menus is fast, with only a slight delay between pages. Network performance was respectable, with write speeds performing around the middle of the pack, while reads were toward the upper end.

The DS413 is a value-packed four-bay NAS for serious network users. It's rather pricey compared to simpler home network NAS devices, but for those who can use the advanced features, it's a real steal.

NAS DEVICES - READ SPEED



NAS DEVICES - WRITE SPEED



6/10

$1,470

FOUR BAYS

CIFS/SMB, NFS, FTP, WEBDAV

RAID 1, 5

WD Sentinel DX4000 4TB

Bogged down by Windows bloat.

@ www.wd.com

✓ Windows operating system, remote web access, well built.

✗ Windows operating system, lacking features, expensive.

It might specialise in creating storage, but networking isn't an area that WD is renowned for. Can one of the world's largest hard drive manufacturers deliver a compelling business storage solution, matching the quality of long-time veterans such as QNAP and Synology?

The first thing that's noteworthy about this NAS is the choice of operating system. While the vast majority use custom-built versions of Linux, the DX4000 runs Windows Storage Server 2008 R2 Essentials. This makes the experience much more familiar for your average Windows user and yet we found it slightly trickier to set up, despite being more comfortable with the design.

The setup process is much longer than every other NAS device, as it requires each client PC to install Windows Connect software – it simply can't be managed from a server browser. The OS also has higher system requirements to run, although 2GB of memory and an Intel dual-core Atom CPU running at 1.8GHz help to keep things going relatively smoothly, if not instantaneous. It's a well-built machine, with a solid metal case and LCD screen (as expected, given the extremely high price), but it's also very noisy thanks to some overactive fans.

In terms of features, out of the box it feels quite lacking compared to the others, especially at this price. Other than simple backup options and basic media sharing, there's not a lot to see; ultimately, this is designed solely for storage across the network. We also noticed an incredibly long RAID rebuild time that was still going after several days – too long for us to wait before testing. One feature that's particularly worthy of mention is the Remote Web Access, which allows external configuration of the device.

Considering the price and features, the DX4000's fallen behind many of its competitors since it first launched. Unless you need a Windows Storage Server-based solution, there are much better options available.

SIX BAYS

RAID 0, 1, 10, 5, 5 + HOT SPARE, 6

GIGABIT ETHERNET

9/10

$900 diskless

Iomega StorCenter px6-300d

The px4-300d on steroids.

@ www.iomega.com

✔ Brilliant interface, blistering performance, packed with features.

✖ Still requires software installation, slight fan noise.

If you're looking for a serious NAS to handle a small to medium business, the px6-300d is the class of storage for you. With six bays it can support a maximum of 18TB of storage, more than enough for everyone but video editors and design studios. The emphasis here is on sharing file access to multiple clients at once, not to mention robust backup options.

It's for this reason that it uses a zippy dual-core Intel Atom CPU running at 1.8GHz paired with 2GB of memory. If you purchase the unit with Iomega-supplied drives they'll spin at 7,200rpm with an average seek time of just 4.17ms. These impressive hardware specifications were backed up by our benchmark results, with the px6-300d coming second fastest in write speeds and fastest in read speeds.

Access necessitates a software installation first, which allows for basic shared directory creation. It's also the launchpad to the browser interface, which is an absolute delight to use. Not only is it easy to find all the key features, they're all explained in plain English, making this comprehensive storage solution easy to use for non-networking experts.

Some of the advanced features include multiple RAID options (0, 1, 10, 5, 5 + hot spare and 6), numerous cloud options (Amazon S3, Atmos Backup, AXIS Video Hosting and more) as well as video surveillance applications such as SecureMind.

The support for different protocols is overwhelming, including iSCSI, NFS and more. Hardware monitoring is similarly impressive, with temperatures, fan warnings, UPS support and voltage monitoring. There's even an LCD on the front for easy diagnostics, along with twin USB 3.0 ports on the rear. There's a wealth of multimedia and personal cloud functionality, too.

It's a surprisingly affordable option. Considering the excellent interface and blistering performance, it's recommended for those who want a more powerful NAS device.

EIGHT BAYS

SYNOLOGY HYBRID RAID

RAID BASIC, JBOD, 0, 1, 5, 5 + HOT SPARE, 6, 10

9/10

$1,000 diskless

Synology DS1812+

Welcome to the big league.

@ www.synology.com

✔ Eight bays, blistering performance, detailed interface and feature set.

✖ No LCD screen, plastic drive bays.

If you're looking for maximum storage, this eight-bay unit should fit the bill. With a maximum capacity of a whopping 32TB, it's packing some serious hardware to move so much data around. An Intel dual-core Atom speeds by at 2.13GHz and there's another 1GB of DDR2 (user upgradable to 3GB) to act as a cache. There are also twin eSATA ports, a handful of USB 2.0 and 3.0 ports, and twin Ethernet adapters. Yes, it's all very impressive, especially at this price point.

The DS1812+ performed like a bat out of hell, in the top three – that's especially impressive considering it was doing an error check on the RAID at the time (which takes around a day to complete). Yet for such a powerful machine, the all-plastic drive bays look a little flimsy at first glance. Thankfully, their clever design makes them extremely stable and easy to mount.

With twin WD Red 1TB NAS drives fitted, fan noise was incredibly low for such a big machine. The LCD screen is strangely absent, but a few diagnostic LEDs help point out obvious errors.

Heading into the interface reveals a plethora of options targeted at experienced network boffins and given Synology's high-end experience, the overwhelming number of protocols supported is no surprise. It's all very well laid out, with helpful wizards to guide you, but it's probably a little too overwhelming for absolute novices.

For those who know what they're doing, there's a level of control here that's hard to beat. One unique feature that we loved is the Synology Hybrid RAID feature, which allows different-sized disks to be built into a RAID, yet all of the space on every drive is utilised. There's also a range of plug-ins like those on the Netgear products, except they're free.

There's a reason Synology is renowned as one of the leaders of the NAS market and the DS1812+ is part of that. It's a great platform for medium-sized businesses or especially demanding networks. apc

BATTLE OF THE MEDIA CENTRES

Several programs want to manage the playback of media on your PC. Mike Le Voi assesses the top media centres and players.

We love watching TV and movies, so downloaded and installed the latest versions of the software below. In the media centre category, we tested:

- Windows 7 Media Center
- XBMC 11.0
- MediaPortal 1.2.2
- JRiver Media Center 1.17.0.99

In the standalone media player category, the players we compared were:

- Windows Media Player 12
- VLC 2.0.1
- MediaMonkey 4.0.3
- foobar2000 1.1.11

There are two features that distinguish a media centre from a media player. The main feature is the '10-foot experience'. By this, I mean the ability to control the player from the other side of the room, using a mouse or keyboard, but preferably with a remote control. The second feature is the ability to play most media types. Only media centres will record and play TV. In the media player category, MediaMonkey and foobar2000 are strictly audio players.

Most of the software we've listed in this comparison is free – you've already paid for Windows 7, of course. MediaMonkey has a Gold version for US$25, but we only tested the free version. JRiver Media Center (JRMC) is US$50, although this allows installation on all PCs in the house.

INSTALLATION & CUSTOMISATION

We installed all the software with default settings. Obviously, Windows Media Center (MCE) and Windows Media Player (WMP) come preinstalled on Windows 7. All software installed cleanly; however, MediaPortal took the longest as it installed many required components separately. Customisation of all the products can be quite daunting. In general, we tried to do minimal customisation. Only MediaPortal had a customisation program, as opposed to making changes from within the main GUI. We found this to be most awkward.

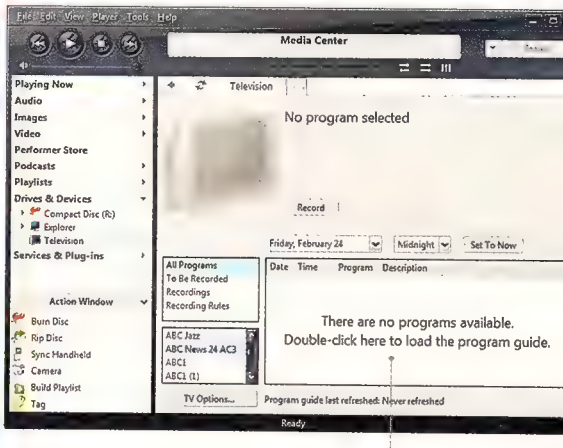
MEDIA TYPES

Television. There's no reason not to watch TV on your media centre PC. A cheap Freeview USB TV tuner can now be bought for about $30.

The basic requirement for TV is to support an electronic TV guide, to play/pause live TV, and support the recording and playback of individual programs and series.

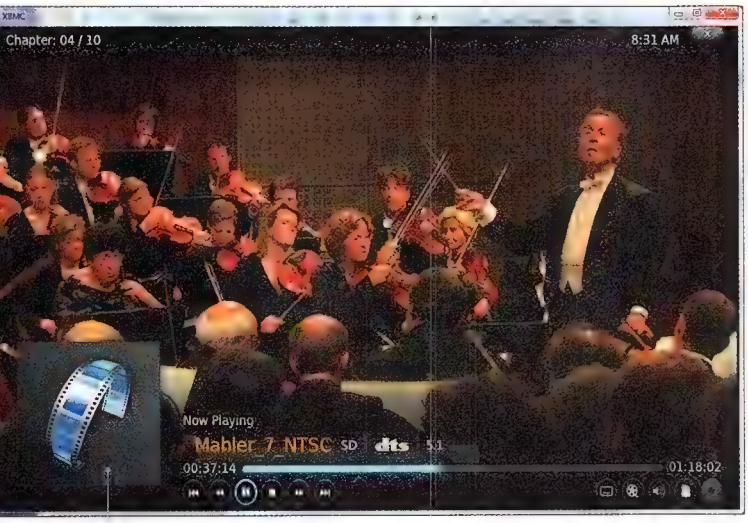
In this category, the clear winner is MCE. After installing the drivers for the TV tuner, you can basically let MCE discover the TV tuner and the TV channels for your region. In many countries, the electronic program guide (EPG) is supplied via the internet. In Australia, Freeview has 'in stream' EPG data and MCE uses that by default. In the settings part of MCE, you define the pre-padding and post-padding amounts to be used for recording. After that, simply choose programs from the guide to be watched or recorded, or use the search functions to record programs or series by keyword or title.

XBMC and JRMC support most buttons on the Microsoft MCE remote control.

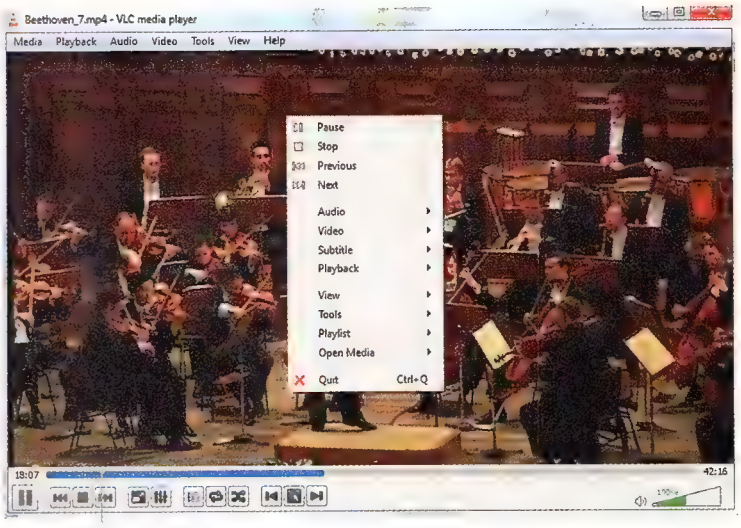


Windows Media Center uses the library features provided by WMP and the Windows 7 Library feature.

JRMC has lots of playback options, but no usable TV support for Australia.



XBMC played our Region 1 (US) DVD without a hitch.



VLC will play just about anything.

XBMC has no TV support; however, you can play back programs that have been recorded by MCE. In our experience, this is unreliable and not worth the effort. JRMC was built for the US market and has no ability to pull the EPG from the Freeview stream.

You can watch live TV or play back TV files recorded by MCE. However, playback of an MCE program recorded from GEM (90) had no sound. MediaPortal has support for TV and the local EPG. In our tests, the EPG was unreliable and often resulted in no guide data. Playback of live TV was acceptable.

DVD. There are two main problems to be overcome for full support of DVD playback: region code and surround sound. For our tests, we tried to play a Region 1 (US) DVD in our standard desktop. Most players refused to do this, as our desktop DVD player is set to Region 4 (Australia). However, both XBMC and VLC played the DVD with no issues.

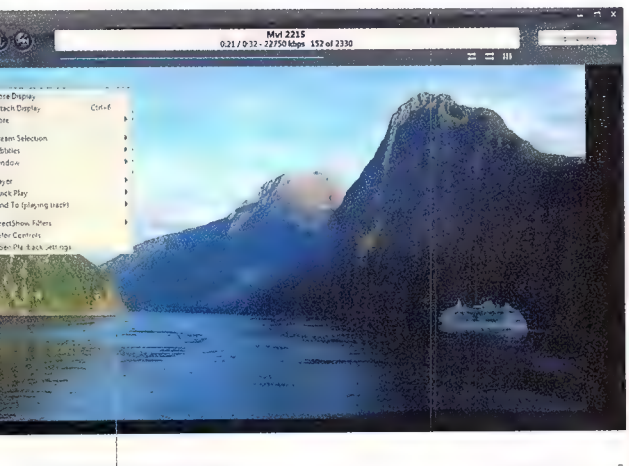
The soundtrack on a DVD is generally PCM, AC-3 or DTS. PCM is stereo and uncompressed. AC-3 is compressed stereo or surround sound – generally 5.1. DTS is higher quality, but isn't supported by some amplifiers. If you're lucky, your desktop or laptop will have an HDMI output for video and sound. Older desktops only have 3.5mm jack connectors for 5.1 audio output. Desktops with S/PDIF can send the digital signal direct to an amplifier or receiver.

For our testing, we used a standard desktop with 5.1 audio output via 3.5mm jacks. We chose a Region 0 concert DVD with PCM, AC-3 and DTS soundtracks, and multiple-language subtitles to test the different programs. MCE played the PCM and AC-3 soundtracks, but no sound was heard when DTS was selected. MediaPortal only played the PCM stereo track. XBMC, JRMC and VLC played all the audio tracks. All media centres could change the subtitles, although only MCE could do this via its GUI while playing. XBMC and JRMC had to use the DVD menu to do this.

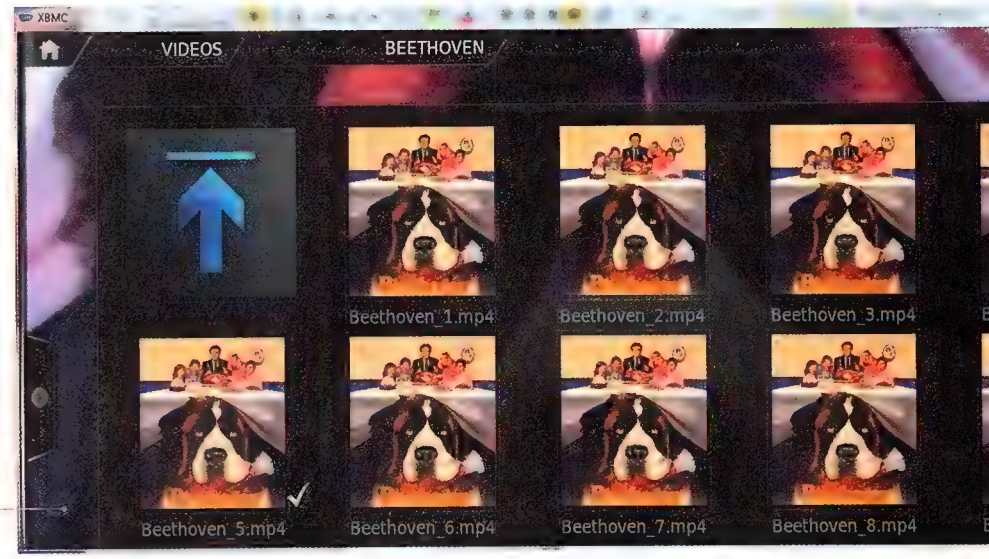
Both XBMC and JRMC support most buttons on the Microsoft MCE remote control. This makes switching between media centres easy. In this category, XBMC and JRMC are the clear winners. To wrap up the DVD section of this testing, we should consider the other, but rarer, type of DVD: the DVD-Audio. The DVD-Audio disc is normally only produced for very high-quality sound, as the AUDIO_TS directory typically contains surround sound, 24-bit/96kHz audio. None of the media centres played the test DVD-Audio disc. However, foobar2000, with its DVD-Audio plug-in, correctly found the 5.1 files in the AUDIO_TS directory and played them. It also has a convert option to extract the individual tracks in WAV format, which can then be converted to FLAC if required.

VIDEO. This is probably the hardest type of media to support due to the hundreds of different file types and audio/video combinations. Of the media players, VLC will play just about anything, but WMP is no better than MCE. MCE will play a lot of video file types, but won't play .MKV files. In addition, it won't play a video file with an AC-3 soundtrack. This makes no sense to me, as it'll play a DVD with the same AC-3 soundtrack.

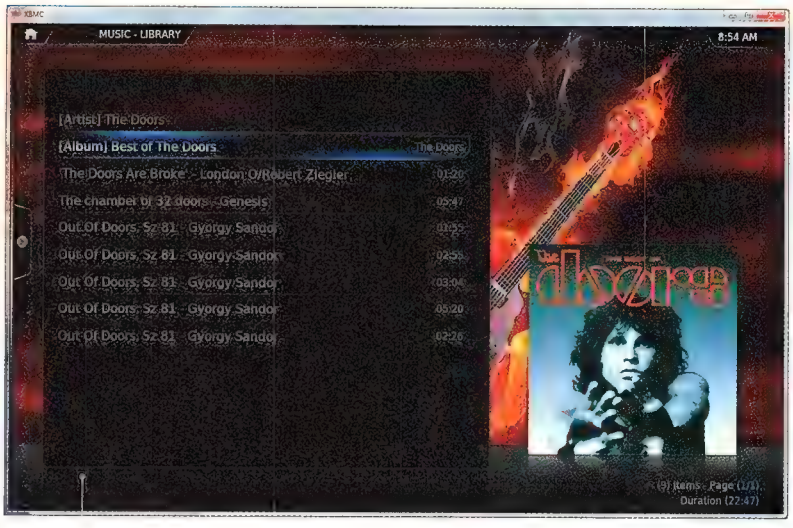
These issues can be solved by installing codec packs. In general, I refuse to use codec packs, as installing one or more can have disastrous effects on a Windows 7 installation. MediaPortal refused to play many



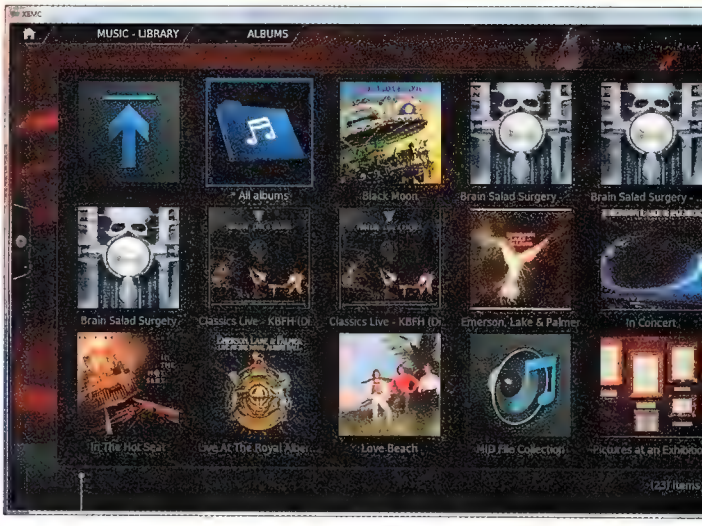
Among all the players here, JRMC is the most advanced media centre.



The XBMC DVD menu provides settings options.


MUSIC - LIBRARY
8:54 AM
[Artist] The Doors
[Album] Best of The Doors
The Doors Are Broke - London O'Robert Ziegler
The chamber of 32 doors - Genesis
Out Of Doors, Sz.81 - Gyorgy Sandor
Out Of Doors, Sz.81 - Gyorgy Sandor
Out Of Doors, Sz.81 - Gyorgy Sandor
Out Of Doors, Sz.81 - Gyorgy Sandor
Out Of Doors, Sz.81 - Gyorgy Sandor
(9) Items - Page (1/1) - Duration (22:47)

A search for doors in XBMC will find albums by The Doors and a piece of music called 'Out of Doors'.



XBMC is the best freeware media centre, with its ability to play just about anything out of the box.

of the files we tried. The error message was normally 'missing codec'. It even failed to play files that MCE and WMP played quite happily. In our testing, it was the worst of the players.

In contrast, XBMC and JRMC played every file we tried, including stereo and 5.1 surround sound videos. In addition, both XBMC and JRMC have numerous options to change video settings during playback, including brightness, contrast, aspect ratio and more. MCE only has the ability to change the aspect ratio during playback.

Both XBMC and JRMC can download cover art to make the onscreen selection process easier via the 10-foot experience. The downloaded artwork is normally correct. However, if your video naming convention isn't strict, the downloaded cover art bears no relation to the actual video! In this category, once again, XBMC and JRMC are the winners.

MUSIC. This is a hard category for different reasons. Firstly, most users have thousands of audio files as opposed to hundreds of video files or DVDs. All these files have to be catalogued by the various programs to make searching for the required files easy. Next, unless you want to browse your music collection by artist or composer, it's almost impossible to find what you want to listen to using a remote control from the other side of the room. The third problem is the various audio file types.

WMP and MCE will play WAV, MP3 and WMA. However, the preferred file type for music is FLAC, which is lossless and supports tagging. Neither program will play FLAC audio files natively. To give WMP and MCE this ability, I use the FLAC/OGG codec from here: **xiph.org/dshow**. It works well and has caused no problems on my PCs. Next, as WMP has no native FLAC tag support, you need to install a WMP library plug-in or WMP and MCE won't catalogue your .FLAC files. I use WMP Tag Plus (**tinyurl.com/8lydbor**). All the other media players support FLAC.

To search your media, you need a media player with its own database and search engine. VLC has simplistic library abilities, while MCE uses the library features provided by WMP and the Windows 7 Library feature. All the other players have their own databases, which can be searched using their own GUI. MediaPortal has no in-built search engine, but one can be added by installing a plug-in. I was unable to make it work on our test PC. No doubt it works on other PCs.

MCE and XBMC have the most basic search engine. For example, a search for doors will find albums by The Doors and a piece of music called 'Out of Doors'. The problem with the XBMC search engine is that it finds no files when the search criteria is doors love – even though there's a song called 'Love me two times' by The Doors.

It also has no ability to search the 'Composer' tag, so it's not suitable for anyone interested in classical music. If you have a large music collection, these players aren't suitable for playing audio unless you want to make simple searches or browse by folder, artist and so on. Having said that, both of these media players have beautiful eye candy while the music is playing.

WMP has good search features, including support for the 'Composer' tag. It found the correct tracks using our example of doors love . JRMC has even better search capabilities; indeed, it supports doors love flac , which will find the .FLAC files and ignore other file types.

MediaMonkey and foobar2000 also support this form of extended searching. However, in JRMC 'Theatre View', which is the full-screen view equivalent to that of MCE and XBMC, the search ability is limited. The correct files appear to be selected, but are in no particular order. This is useless for playing back classical music.

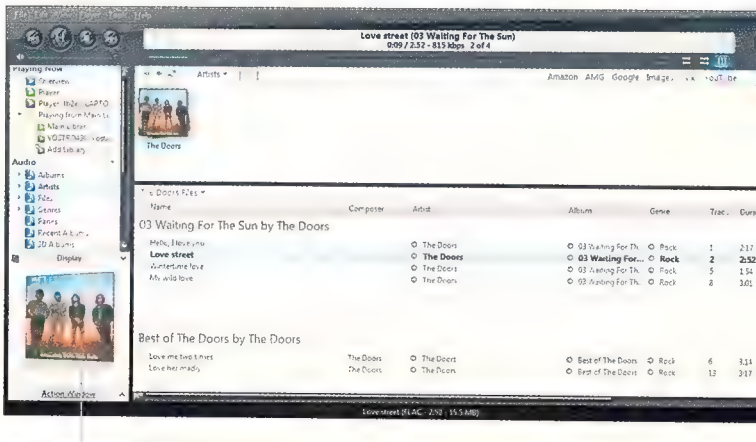
Therefore, unless you want to browse by album, artist and so on, there are really no media centres that are suitable for selective music playback. JRMC is the best, but not in 'Theatre View'. Paradoxically, the best 'media centre' for music playback is foobar2000. It has the ability to change the default fonts and screen layout. As long as you're willing to look at your wireless keyboard while you type, you can get a usable, albeit unattractive, GUI and then easily choose what to play.

AUDIO QUALITY

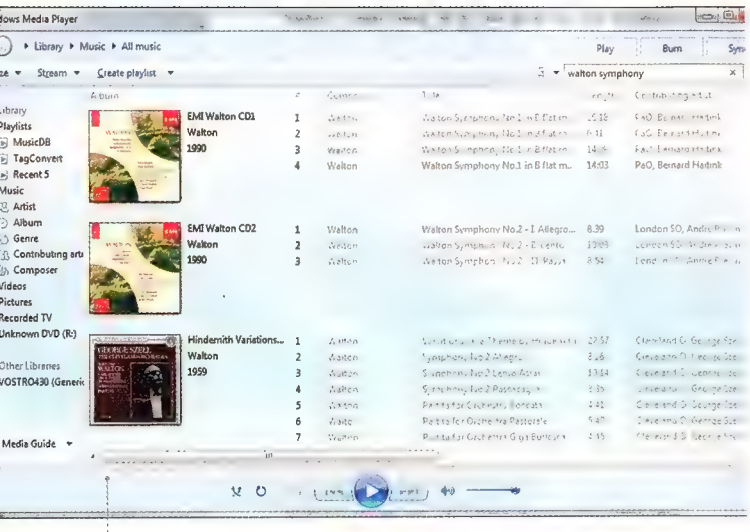
Audio under Windows 7 has improved compared to XP and the default sound output is Direct Sound. The Windows mixer has to match the input audio to the output settings, so you should set the audio properties of the sound card to match the sound file to avoid resampling.

In addition, the sound is converted to 32 bits before being down converted to the 16 or 24 bits supported by your sound card. This way, high-quality can be achieved, even in basic players.

Under Windows 7, there's also a new type of playback mode, called WASAPI (Windows Audio Session API). Using WASAPI, the application



JRMC supports a format search.



WMP, MCE, MediaPortal and VLC only support Direct Sound. The others all support WASAPI.

sends the output direct to the sound card and bypasses the mixer and sound resampling. More importantly, it allows the application to open the sound card for exclusive use. No more will that web page blast an advert at you while you're listening to your favourite music! Finally, high-end sound cards support ASIO, which is the standard developed by Steinberg. ASIO also bypasses all native Windows controls when sending the data from the player to the sound card.

WMP, MCE, MediaPortal and VLC only support Direct Sound. The others all support WASAPI. In addition, JRMC and foobar2000 support ASIO. JRMC has many options to control audio quality, including bit rate, resampling and surround sound down-mix to stereo. It's the winner in terms of its options for playing high-quality audio.

UPnP

UPnP can be used to send the media around your network. In a purely Windows 7 world, there's little need for this as media can be shared by Windows Simple File Sharing. However, there are more and more DLNA hardware devices that can play media stored on a central library PC.

Windows 7/WMP, XBMC, JRMC, MediaMonkey and foobar2000 can all act as UPnP servers and advertise their content for other users to play. The same programs can also act as renderers. This means a UPnP controller can send media to be played on the remote device. In native Windows 7, this is supported by 'Play To' from Windows Explorer.

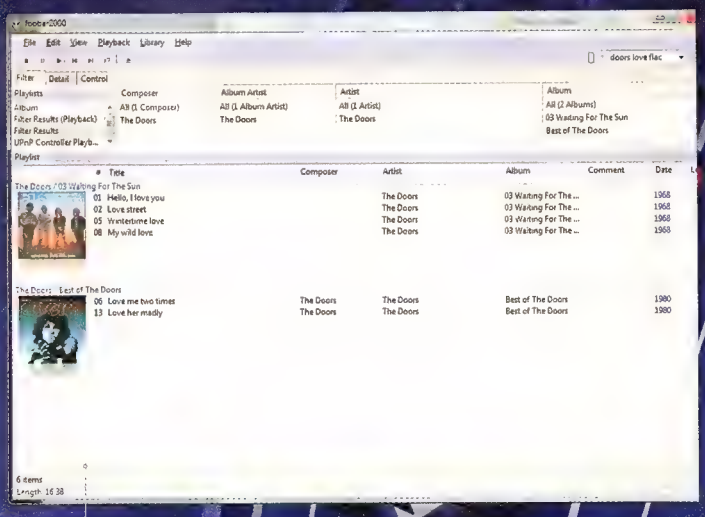
JRMC and foobar2000 can also act as UPnP controllers. This means that, for example, you could start XBMC on your media centre PC and then send music to it via a playlist on your desktop using your copy of foobar2000. This is another solution to the problem of searching your music or video files with a readable GUI, but being able to play the media on your media centre PC.

CONCLUSION

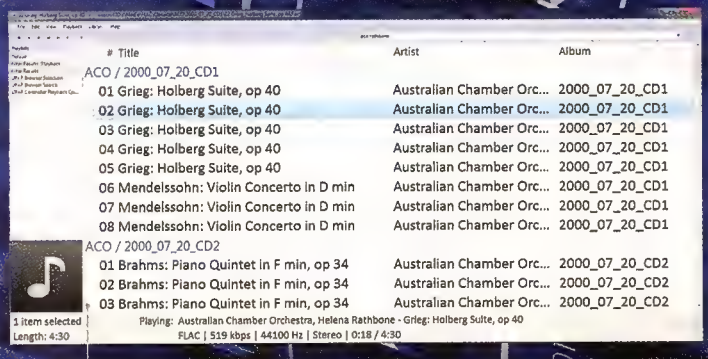
The most advanced media centre is JRMC. It has hundreds of audio and video playback options, as well as UPnP capabilities, but no usable TV support for Australian conditions. It costs US$50, although for that you get an amazingly capable program. XBMC is the best freeware media centre, with its ability to play just about any media out of the box and be able to control the quality of the video and sound output. However, it has no support for TV either.

MediaPortal promises a lot of features, yet many of them didn't work in our limited testing. MCE is the king for TV support, but needs lots of codecs and tweaking to be able to play all media files. We believe that foobar2000 is the best purely audio player, although it needs some tweaking and plug-ins to be able to use all its features. VLC is the best standalone media player.

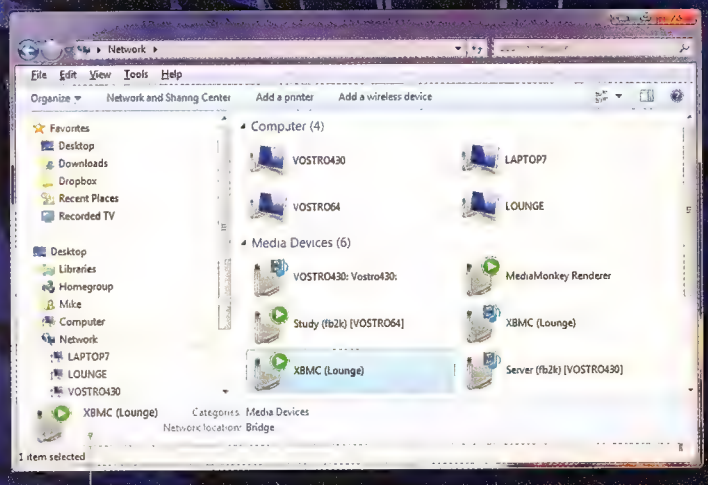
As you can see, there's no overall winner. You should use the program that best fits your needs for the media type involved.



You can change the default fonts and screen layout in foobar2000.

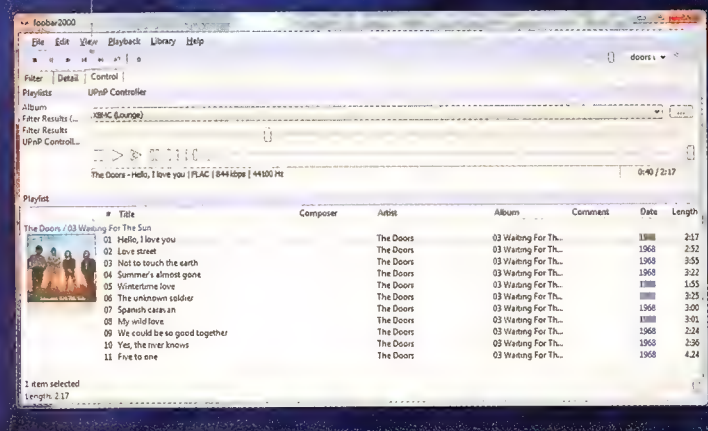


MediaMonkey and foobar2000 are strictly audio players.



You can use foobar2000 as a UPnP server...

...to send media to be played on a remote device.



Windows Store

WINDOWS 8 STORE OPENS

We know the good apps are coming, but maybe Microsoft could have worked harder at populating the Windows Store. There's really not much in it for now, but expect that to change.

The main question you ask yourself when you first look inside the Windows Store is: where are the decent apps? It's no surprise there aren't many since the store has only just opened, but what's surprising is that, at the time of writing (two weeks after the Windows 8 launch), there's a lack of even basic apps, such as a Facebook by Facebook, let alone Modern UI versions of heavy duty desktop software such as Adobe Photoshop.

Microsoft stresses that the number of apps in the store is growing at something like 500 per day, but at roughly 10,000 apps it's going to be a long time before the Windows Store matches the 700,000 or so iOS apps in the App Store or the 560,000 or so on Google Play.

Worse, we're not sure if the 10,000 apps that Microsoft was quoting at the end of October included the Windows Store apps that aren't actually apps, but links to the desktop versions of these apps on external web sites. We experienced a 'WTF?' moment when we realised just how many 'apps' in the 'Productivity' section of the Windows Store were actually links to external apps.

So what apps in the store are worth getting? Here are five of the best.

1 METROTWIT

We love this free Twitter app and best of all, it's designed by Pixel Tucker, an Aussie company. What's really impressive about it is that its user interface is extremely intuitive and addresses the failure of many Twitter clients to make it easy to get to your mentions and direct messages quickly with one touch. It puts this right in front of you in a column on the left side and makes switching between them easy. Crucially, the app is also easy to work with a keyboard and mouse. Pixel Tucker is clearly a group of developers that understands Modern UI should also be usable on a PC without a multitouch screen. Hallelujah.

2 EVERNOTE

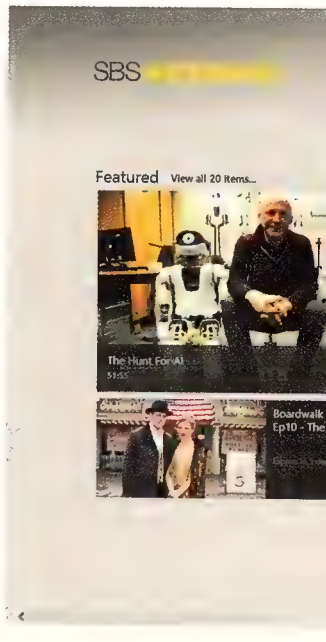
One of the first apps we'll download on *any* platform, a Modern UI version of Evernote is now in the Windows Store. Evernote is an information-capturing app that lives on PCs, Macs, iOS and Android (and is different on almost each one, to the chagrin of its multi-platform users). The Windows 8 Modern UI version is different to all the others yet again, including to the version of Evernote you'd run on the traditional desktop side of Windows 8. Like everything designed for the Modern UI side, Evernote is pleasant to use with your fingers on a touchscreen and even gives you the hierarchal arrangement of tags, something it failed to do on the iPad version for years. On a PC with or without a multitouch display, we'd still use the desktop version of Evernote; on a tablet, though, the Modern UI version would definitely cut it. The basic version of Evernote is free.

3 KINDLE

One of the first things you'll want to do with Windows 8 on a tablet is read books and luckily, Amazon has a Modern UI version of its Kindle reader. This will let you download *Fifty Shades of Grey* in the privacy of your own tablet to see what the fuss is about. You can also sync your last page read across devices and customise your bookmarks, notes and highlights as you do with the app on other platforms. The Kindle app definitely feels more natural to navigate on a touchscreen device than on a PC, but like MetroTwit, it's designed to work well with just a keyboard and mouse.

4 SBS ON DEMAND

SBS is one of our most progressive media organisations when it comes to ensuring it's on every platform, and predictably, its SBS On Demand app is the first local TV catch-up service to appear in the Windows Store as a Modern UI app. We found the right-to-left scrolling of the Modern UI suits the app content perfectly, as it nicely displays the big collection of SBS series, documentaries, news and more that's available for you to watch for free. SBS is one of several media organisations appearing in the Windows Store, which range from the usual suspects such as the BBC (which thanks to its seemingly infinite British taxpayer-funded budget is on any platform you care to name) to new players such as WPDownUnder, a service covering Windows 8 phones.



5 LASTPASS

We were pleasantly surprised to see that our favourite free password manager, LastPass, is available in the Windows Store, which means we'll be able to carry our 1,200 passwords or so to any Windows 8 tablet. LastPass stores all your usernames and passwords securely and then automatically fills in login details when an application or web page next asks for them.

GAMES

'Games' is unsurprisingly one of the most well-populated parts of the Windows Store. Here are our quick picks of the ones worth checking out.

ADERA

This free tap-centric adventure game is one of the Windows Store's real gems -- it's a puzzle-based, first-person adventure game made by Microsoft. There are heaps of environment-based puzzles to wrap your head around and environments to explore, and it ties in with Xbox Live, so if you have an Xbox Gamertag you can even earn achievements for it.

CUT THE ROPE

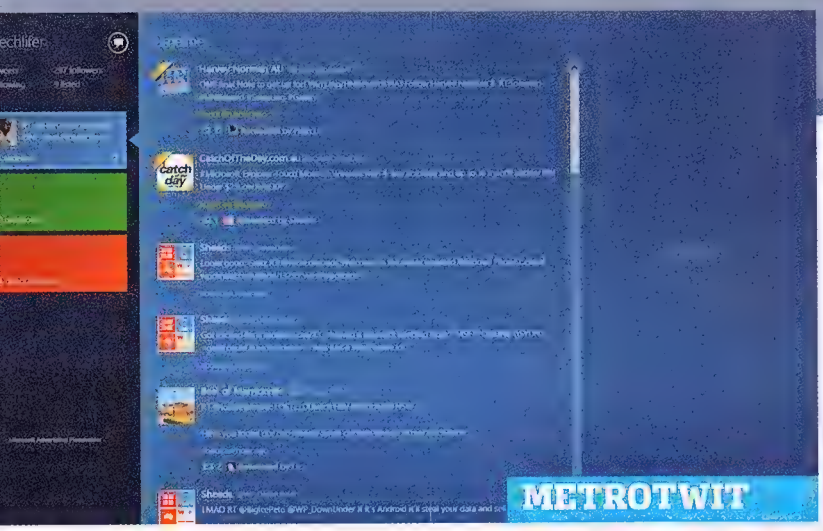
This cute physics-based puzzle game was a huge hit on iOS and Android, and it challenges both your smarts and reflexes. As the name suggests, you'll need to cut ropes (and more) in order to swing a candy treat into the mouth of a little green monster. There's a shedload of levels and while it sounds simple, it involves lots of mental gymnastics and expert timing to progress.

MICROSOFT MAHJONG, MINESWEEPER & SOLITAIRE

This classic trio of Windows games aren't included with the OS by default, but you can download them all for free (in touch-enhanced glory) directly from the Windows Store. That's should take care of all your procrastination needs... well, at least for the next few months.

EVAC, RADIANT & RADIANT DEFENSE

These three titles from indie studio Hexage may look visually similar (a mix of dark backgrounds and bright neons), but they offer different gameplay experiences. *EVAC* is a unique take on *Pac-Man*, *Radiant* is a *Space Invaders*-style vertical shooter and *Radiant Defense* is a weird and wonderful tower defence title. They're all worth grabbing and they're free, too.



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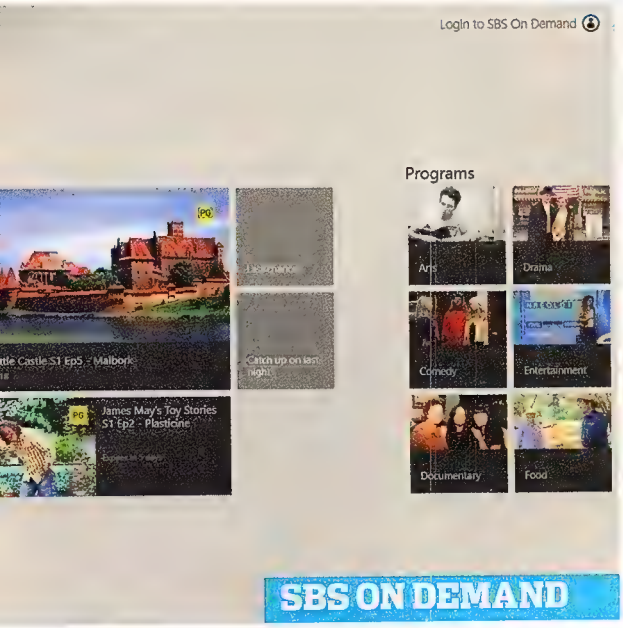
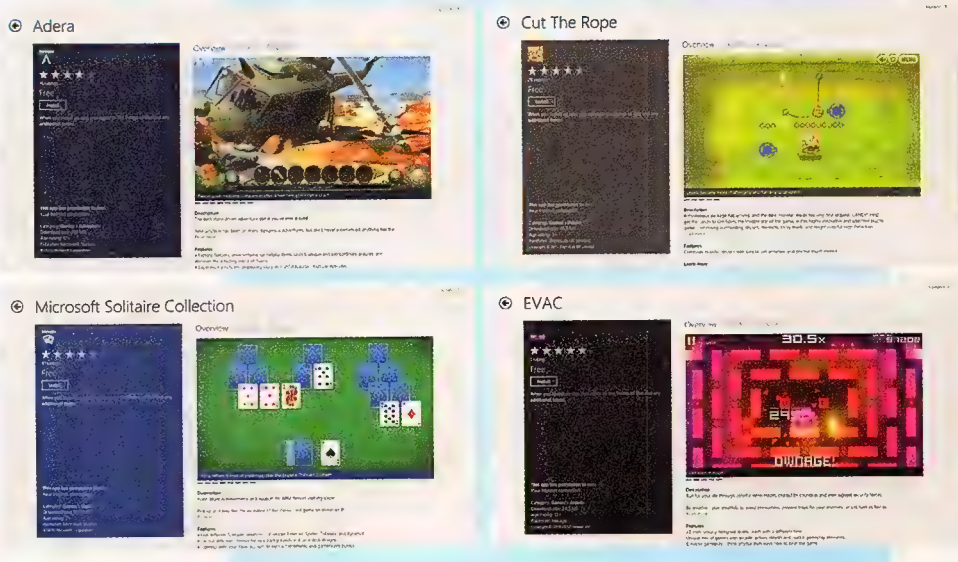
EVERNOTE





Mac Store | APPS

Small Street

A fun diversion.

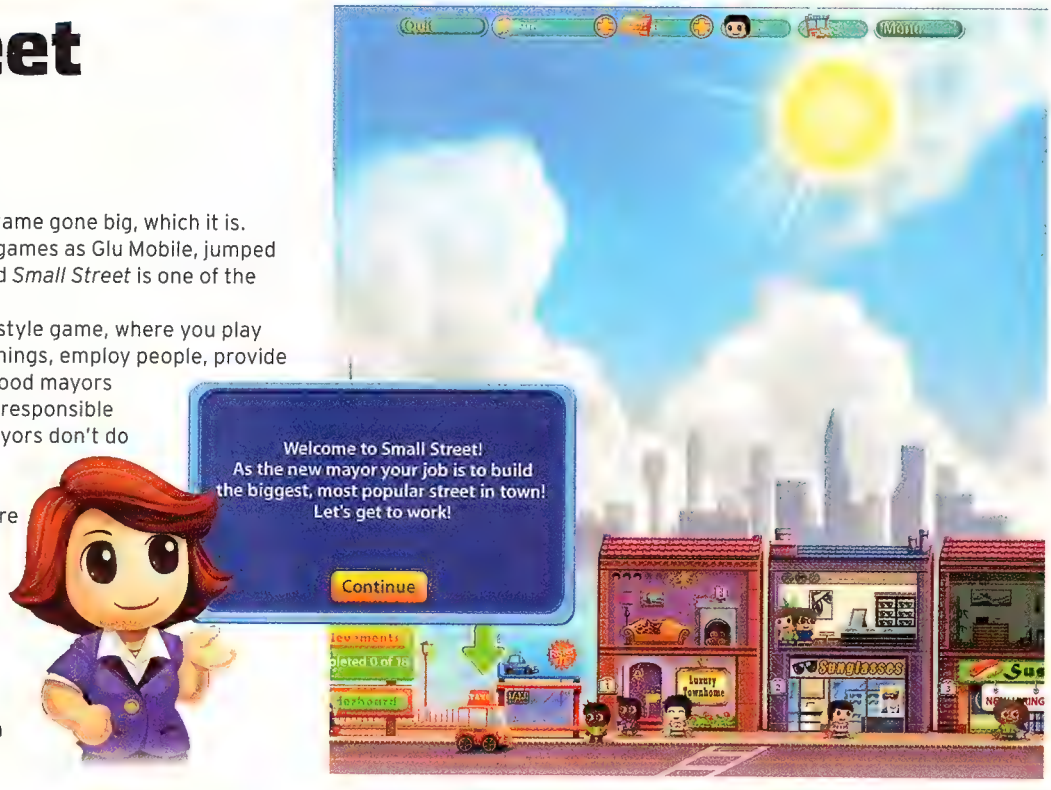
Free | Glu Games | tinyurl.com/9v28dac

Small Street looks and feels like an iPhone game gone big, which it is. Glu Games, which made its name in iPhone games as Glu Mobile, jumped into Mac development a few months ago and *Small Street* is one of the first fruits of its new labours.

It's basically a two-dimensional *SimCity*-style game, where you play the mayor of a town and you have to build things, employ people, provide services and all the rest of the things that good mayors do, plus more. For instance, you seem to be responsible for running the town's taxi service. Most mayors don't do that, I think.

You earn coins and credits for making achievements and you use those to build, hire and stock the stores, and so on. Naturally, as with so many free-to-play games these days, your tasks can be made easier by paying real-world money to get extra coins and credits, which in turn will speed along your efforts to earn in-game cash.

It's an odd choice for the jump to big-screen entertainment, but it's a nice enough casual diversion.


Quit
Welcome to Small Street!
As the new mayor your job is to build the biggest, most popular street in town!
Let's get to work!
Continue
Luxury Townhome
Sunglasses

Memory Clean

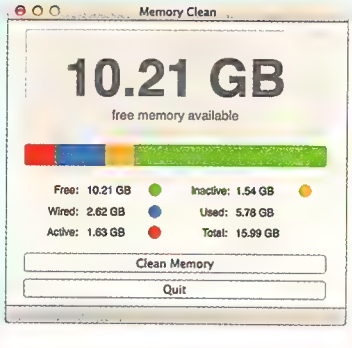
Free for a limited time | FIPLAB | tinyurl.com/cuqx7wa

It seems that the more memory we cram into our computers these days, the more our applications demand. It gets worse if – like most people – you open up multiple applications at a time so you can switch easily between them. Go on, you know you do. As I write this I've got eight applications open and that's a slow day.

It's great, but it can lead to problems. Some applications (especially games) don't always let go of the RAM they're using when you quit them, which means you can end up with a computer that's not performing at its best.

Memory Clean is a simple utility that does a simple thing: figures out what RAM isn't currently being used by any applications and frees it up. That's all.

If you're keen it can tell you how much memory you're using, how much is free, how much is being grabbed by background apps and so on, but why do you want to know that? The useful thing is getting it running as smoothly as possible and that's as simple as clicking a button – or you can activate it from the menu bar for even more convenience.



NodeBeat

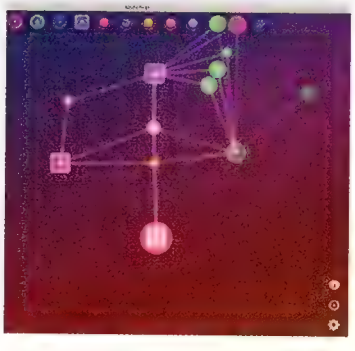
$1.99 | AffinityBlue | tinyurl.com/92fungm

Another app making the jump from iPhone to Mac (via the iPad) is the excellent NodeBeat, a very simple (or staggeringly complex if you're skilled) music creation program. You drag 'nodes' (which represent beats or notes into the window) and join them up. That's the simple part. The more nodes you drag, the more interesting the beats and melodies you can generate become.

You can then customise waveforms, synchronise nodes as well as generate octaves and arpeggios, modulate and more. It takes literally seconds to start making cool-sounding electronic music, but once you get the hang of it, you have extraordinary power available.

The tap-and-drag interface is a clear sign of the program's roots on iPhone, but the mouse (or trackpad) opens up greater flexibility than the simpler interface could provide. For example, pausing a node is a tricky two-finger tap on the iPad version of NodeBeat, but it's a right-click on the Mac version (or a two-finger tap that's easier to aim at when a cursor is involved, as with a trackpad).

It's great fun for kids, with a lot of power for serious musos to unlock, too.



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Cinemagram

Arty GIFs go all Instagram.

Free | Factyle | tinyurl.com/8dtlukk

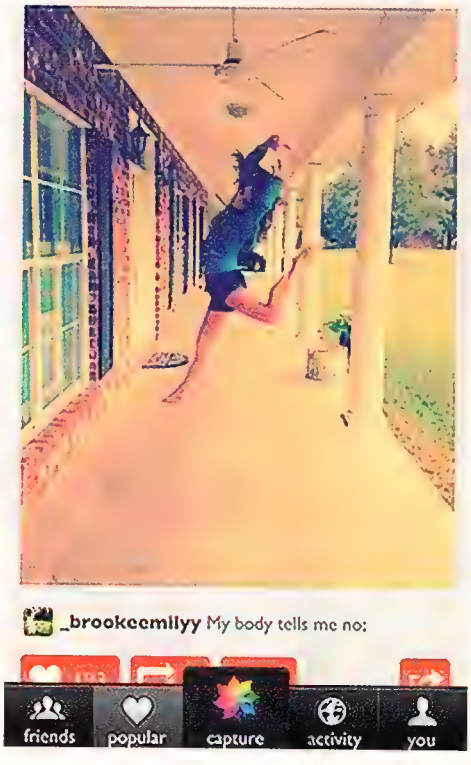
GIFs have been a staple of internet revelry for decades now, but a certain, moodier GIF has gained popularity of late. Known by some as the cinemagraph, it's a still image with only a small portion animated (for a wonderful collection of cinemagraphs from films, see **iwdrm.tumblr.com**, and usually some small form of artistic merit.

To create your brilliant cinemagraph, you first shoot a two- to three-second video. You then review the video, editing it down to make the loop as seamless as possible. Once you've got the loop just so, select a section to be animated. The rest will remain still.

In the popular Instagram style, you can also select a filter, helping give your cinemagraph the mood it so deserves. Before finishing up, you get to preview the image and choose whether you want the cinemagraph to reverse, rather than just loop, which can help with

movements like wind in the trees, but will look peculiar with, say, a kitten chasing a laser pointer.

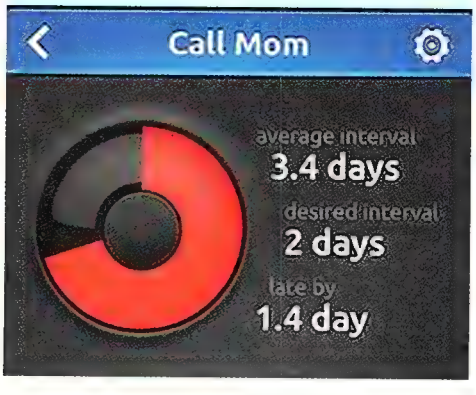
The similarities to Instagram don't end at the name or the filters, either: your finished cinemagraph will be uploaded to the Cinemagram network or more usefully, to Twitter, Tumblr or Facebook.



Doable

99c | Tite I/S | tinyurl.com/8j7a45o

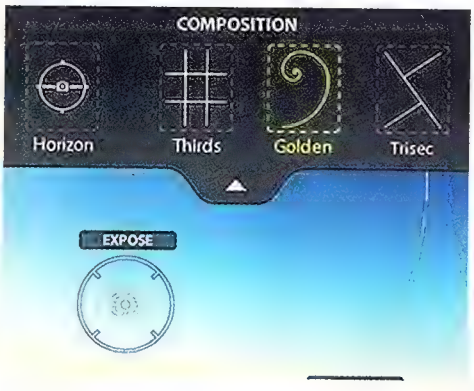
Doable is a task management app that focuses less on tasks and more on habits and goals. It's meant for those repetitive tasks, like calling your mother, practising the euphonium or changing the sheets on your bed. So rather than clogging up your work to-do list, input any repetitive task into Doable, choose an interval in which it should repeat and then swipe it when it's complete. Doable will then tell you what should be done next, including a history of past events, with notes.



Camera Awesome

Free | SmugMug | tinyurl.com/9dbpajm

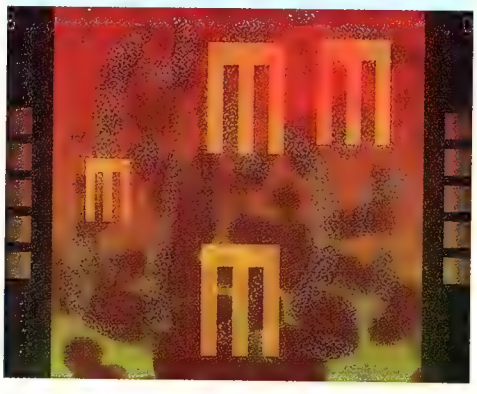
Camera Awesome actually lives up to its name. It does this by offering some of the features that would have once given point-and-shoots the edge over camera phones – namely fixed exposure, burst modes and (soft) image stabilisation – and then adding in useful editing options, simple filters and simple sharing out to your networks of choice. Unfortunately, unlocking all the filters and presets requires a $10.49 in-app purchase, or you can buy individual filters for 99c.



Scape

$6.49 | Opal Limited | tinyurl.com/94tse7z

Brian Eno has released a music app that allows you to create dynamic, ambient performances. You combine different shapes, each creating a different sound and governed by a different rule. The rules are what make this app interesting, as they range from the expected (play a noise every 10 seconds) to reactive (play a noise only when other elements are silent) to environmental (play a different sound in the evenings) and beyond. It's wonderful fun to have piping through a good set of speakers.



Google Play | ANDROID

LoopStack

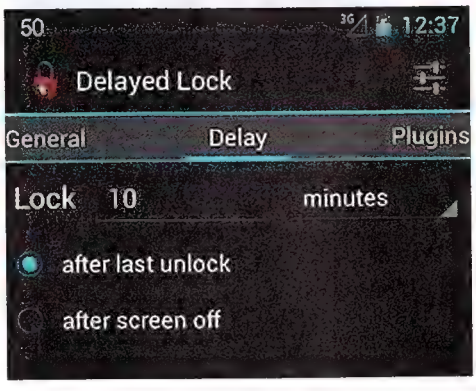
$1.99 | Single Cell Software | tinyurl.com/8p95hjq

Loop pedals are fun for the musician and now that they're $1.99, there's nothing to stop you from becoming the next Reggie Watts (except talent). To start a loop, choose your bpm and record a loop to one of the four channels. Each channel has reverb and volume settings, and while you can only loop up to four separate loops, you can combine those that don't need independent effects. When you're done, you can export your piece as separate and combined .WAV files.

Delayed Lock

$2.49 | J4VELIN | tinyurl.com/8t7mvnl

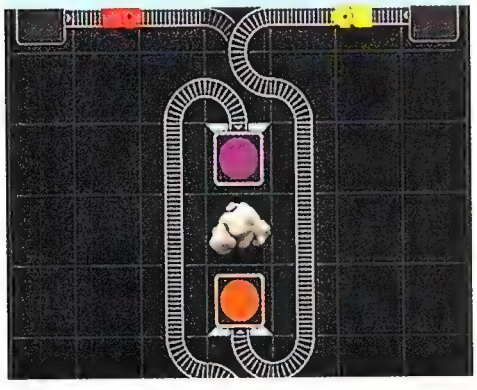
Some ROMs have the ability to set a delay between the time the screen turns off and when the pattern/PIN lock engages. For those that aren't fortuitous enough to have such a feature baked into their ROM, Delayed Lock will give you this frustration-saving feature. You can additionally have the lock disable via location, Wi-Fi/Bluetooth device or widget/notification drawer toggle. This is a bit of a hack and will require root on Android 4.0+, so be sure to test the trial version before committing.



Trainyard

99c | Noodlecake Studios | tinyurl.com/79uuh8h

Use your finger to draw train tracks, guiding the trains to their colour-coded goals. There isn't even a time limit or score. Easy! No. You must also time the trains to collide at certain points – blending or splitting their colours – by extending portions of track as a form of time delay. This can become utterly brain-bending and frustratingly addictive. At times they can seem impossible, so the creators have a user-submitted solutions centre on their web site at **trainyard.ca/solutions**.



Any.DO

Do anything!

Free | Any.DO | tinyurl.com/6ub757w

Task lists are as popular as they are handy, so there are figuratively piles of them available across every mobile platform. So, while we're certainly spoilt for choice, we're also a little bit overwhelmed.

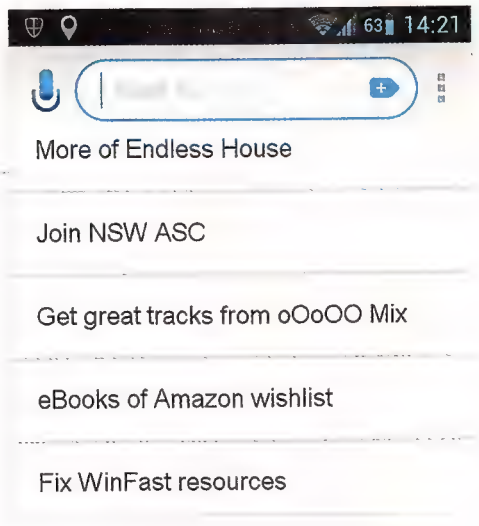
For a task management app to really cut the mustard-doused bratwurst, I need it to not only offer an intuitive, attractive interface, I also need it to be accessible from my primary devices (Android smartphone and iPad), as well as a web browser (in this case, as a Google Chrome extension).

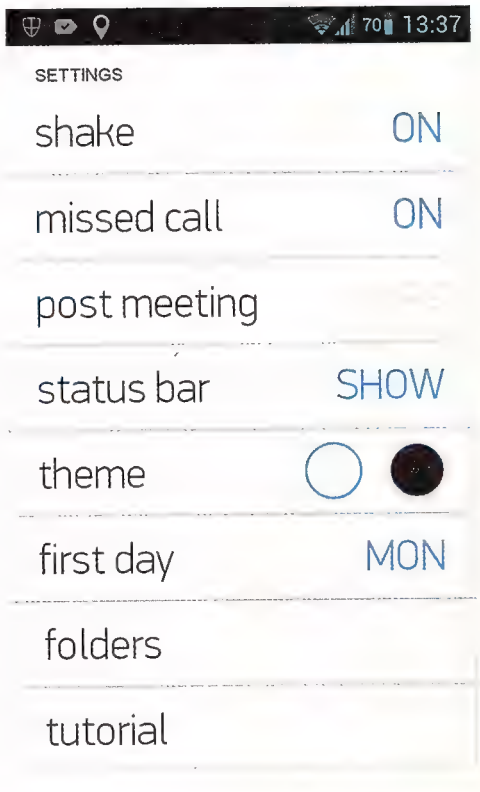
Any.DO does.this.

You can drag and drop tasks to reorder them, and you simply cross them out (swipe across them) when they're complete. Shaking the phone will clear your completed tasks.

New tasks are created at the top of the screen, where you can type or dictate your next task. Tasks can be ordered by date, folder or priority, and can be shared with other people, which is great for grocery lists. Tasks can be imported from Google Tasks, too, where lists are preserved as folders.

You can even have the app pop up after a missed call, allowing you to quickly create a task to call them back – no more accidentally clearing the missed call notification and forgetting to call back the mother-in-law. Joy.





Windows Store | WIN PHONE 8

MyTileMaker Pro

Info on your home screen.

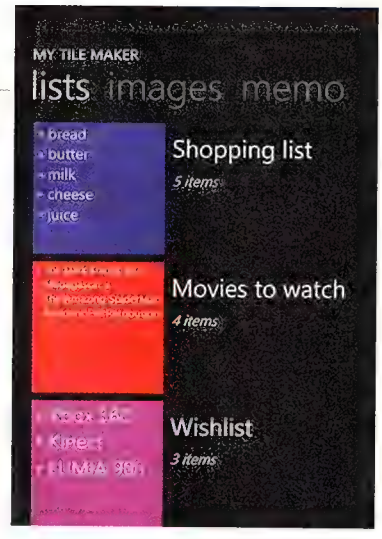
Free / $1.99 | KunRuch Creations | tinyurl.com/9k39lb4

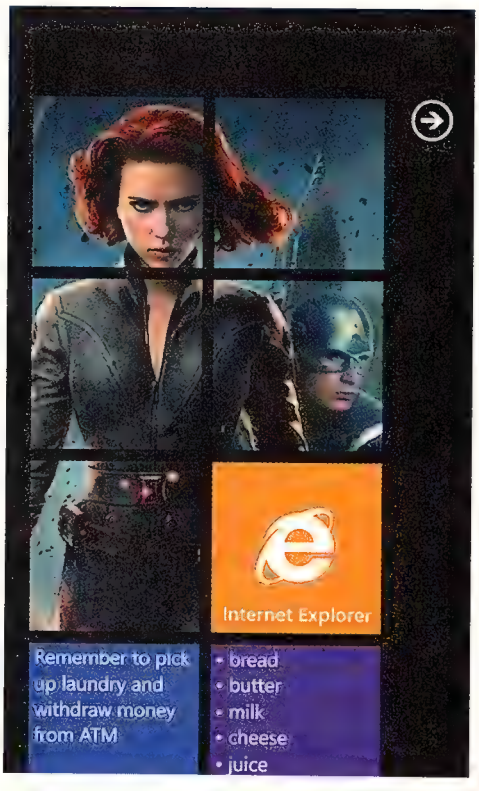
Put the information you need most on your home screen. It kinda makes sense to be able to place the most relevant information in your life in the most prominent place on your smartphone. Android gets this, but no other OS since Symbian seems to.

MyTileMaker Pro gives me what I want: the ability to pin notes, lists and pleasing images to my home screen so they're viewable the very moment I unlock my handset.

There are a few apps like this on the market, but I like that this one differentiates between lists and memos (you can set reminders for memos and lists make it easier to check off items), allows you to email either of the two, and gives you the sorely missed ability to have a pretty picture on your handset.

When creating a memo or list, you can select its colour – or have it chosen according to your existing theme – as well as its font size and backflip behaviour. With an image, you choose how many tiles you want the image split across and it will be automatically split to fit. You do have to manually place the tiles onto your home screen, but that's not really a deal-breaker.

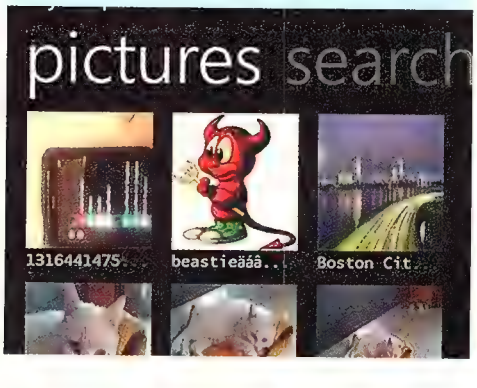




BoxFiles for Dropbox

$1.49 | Neologics | tinyurl.com/9zfktzw

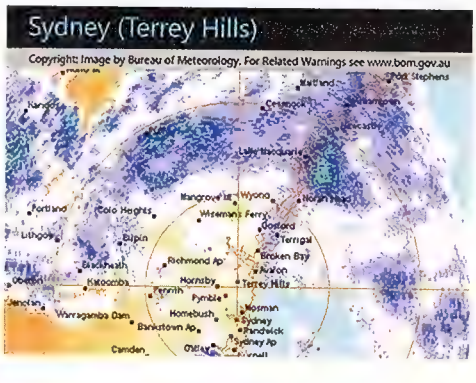
The lack of a native Dropbox client won't be a problem with BoxFiles for Dropbox. The app allowsd you to browse, copy, delete, rename and move the files and folders in your Dropbox account. And with SkyDrive integration, you can move files from your SkyDrive to Dropbox, or download docs from Dropbox, edit them and then move them back to Dropbox. Unfortunately, only image files can be uploaded to Dropbox and it's done so via the Pictures Hub.



AU Weather Pro

$2.99 | mobilewares.net | tinyurl.com/9g8twno

AU Weather Pro provides detailed current observations, with 72-hour historical graphs with metadata, sun and moon rise and set information, as well as seven-day forecasts for more than 280 locations and animated IR radars for 50 sites. There are extended forecasts, marine observations, coastal reports, tide predictions, international observations for major cities, land and marine warnings and more. It also has a Live Tile displaying forecasts, which can then be flipped to link to other locations .



Flux

$2.49 | edonistart | tinyurl.com/8b9qzod

A good RSS reader is still a day-to-day requirement for me – it just helps my morning commute glide by, wafting me away from the stinking pits of obesity and the ear-splitting squeals of youth. Headphones also help. Flux syncs with your Google Reader profile, so you needn't worry about having to import your feeds, and it also means that your starred articles can be found again later. It provides Instapaper/Pocket support (*almost* made moot by its inbuilt offline reading) and includes Live Tiles for your favourite feeds and folders.

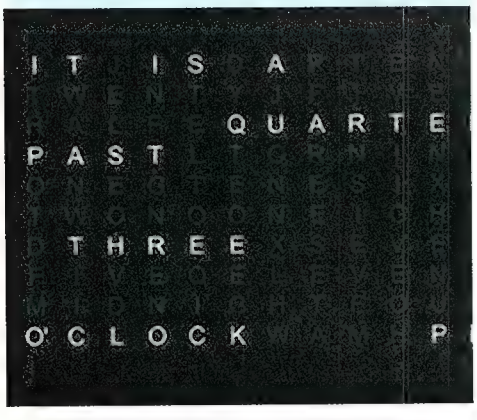
what's new
What Do You Do When You Need a Quick Pick-Me-Up? [Ask The Readers]
Arts & Leisure: 'Footloose,' Craig Brewer's Remake for New Generation
By JULIE BLOOM

App World | BLACKBERRY

WordClock

Free/$1.99 | Flo Group | tinyurl.com/9hva64w

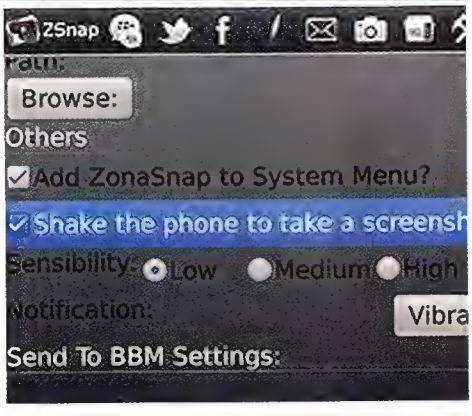
I have a thing for timepieces. A drawer stuffed full of watches is testament to this, but so is the plethora of clocks installed on my plethora of phones (or at least the two OSs that have a place for custom clocks). My cool clock of choice on BBOS is WordClock, which – wait for it – replaces numbers *with words*. So not only does the app tell the time, it also opens a philosophical can of worms: are they still numbers when they're words?



ZonaSnap

US$1.99 | ZonaBlackBerry | tinyurl.com/9yhqcgs

Screen capture apps are always handy – sometimes it's fun to capture and share a shot of that super-fly song you're listening to or a funny Facebook status/tweet you just read. ZonaSnap is especially handy as it integrates with BBM, Facebook, Twitter, email and Photobucket. OK, so Photobucket is less relevant these days, but clearly you're into the whole retro thing anyway – you're still using a BlackBerry.



Application Lock Pro

US$0.99 | S4BB Limited | tinyurl.com/984w32j

If you have a few apps you'd rather other people not see – or maybe just an inflated sense of paranoia – then Application Lock Pro will allow you to password-protect any apps you wish, protecting them from the grasping fingers and inquisitive eyes of Big Brother. If you're paranoid *and* a tightwad, there are a pile of free versions able to lock a specific app only, available at **www.s4bb.com/free-software**.

Pacemaker for PlayBook

Keep a DJ booth in your jacket pocket.

US$19.99 | Pacemaker Music AB | tinyurl.com/8ehjsad

Back in 2008, Pacemaker launched a pocket-sized DJ system for around US$850. Since that time, of course, the digital world has become a different place and dedicated devices have quickly gone the way of the Polaroid. So Pacemaker adapted and has now released a DJ app for a pocket-sized tablet.

The interface has obviously been updated to suit a touchscreen and features the dual-platter configuration that DJs have been comfortable with since hotpants were cool the *first* time. However, in the case of Pacemaker, they also provide the means to apply effects to your music.

To make life easier for the digital DJ, it features auto beat matching, scratching, pitch speed and bend, on-the-fly looping, reversing, cue playing (start from a cue point or jump back to it with a button press), single and double parameter audio effects, track EQ and a smart track search, which allows you to apply filters onto artist, album, genre, bpm or key, to help you find that next track faster.

If you want to listen to one track on your headphones with another coming through the speakers (which is, you know, kinda important when DJing), you will, unfortunately, have to purchase a Griffin DJ Cable. While that *is* extra money, this whole setup is still a fraction of the cost of a DJ setup from just a few years ago.

UPGRADING TO A MINI-ITX SYSTEM

Upgrading an existing PC to a new mini-ITX box is never easy, but Darren Yates takes on the challenge of bringing an old Core 2 Duo system up to date.

This month, I received an email from Romek Szychowski, whose goal is to "build an all-round PC for home that is quiet and attractive". He's not interested in gaming, but is instead after a mini-ITX system that'll do everything from email to video editing. However, he wants to upgrade an existing system and keep as many of its parts as possible.

The existing hardware:

- **Processor:** 2.5GHz Intel Core 2 Duo E5200
- **RAM:** 4GB DDR2
- **Main hard drive:** WD Caviar Black 320GB (must be retained)
- **Extra hard drive:** WD Caviar Green 1TB
- **Audio card:** ASUS Xonar Essence XT (must be retained)
- **Samsung Blu-ray** full size drive (must be retained)
- **PSU:** Corsair VX450W (must be retained)
- **CPU fan:** Noctua NH-C12P (highly desirable to retain, as it is very quiet) with mounting bracket for LGA1366/1156 chips
- **Video card:** 512MB Gainward 8400GS (Nvidia GeForce 8400 GS)
- **Operating system:** Windows 7 Home Premium (OEM) – Romek hopes that swapping the hardware does not mean a new licence is required

Romek's suggested hardware for the PC:

- **Case:** BitFenix Prodigy – attractive case with a single full-size drive slot
- **SSD:** wants a very quick boot time and to store all the OS and apps on it (Romek's apps currently take up around 60GB)
- **The hardware items shown above** that need to be retained
- **Processor:** latest Ivy Bridge Intel chip

THE NEW BUILD

Romek's choice of a BitFenix Prodigy case is inspired, as it featured in the November issue of our sister publication, *TechLife*. The build we featured there would set you back $1,725. However, I reckon we can do much better than that.

But the first thing we need if we're going to get an Ivy Bridge Core i-series processor inside this box is a new motherboard. Given that Romek is looking for a quiet system and doesn't specifically mention overclocking, I'll assume it's not a high priority.

Basically, there are two very good options: ASUS's P8Z77-I Deluxe for around $240 and the cheaper P8H77-I at about $130. The main difference is that the Z77 chipset in the Deluxe gives you overclocking capability, but more importantly, this board also has built-in dual-channel 802.11n Wi-Fi, which can also offer fancy smartphone/tablet remote control. By comparison, the P8H77-I board has the bonus of being $120 cheaper, but also provides two extra SATA II ports. Both boards feature four USB 3.0 and eight USB 2.0 ports, so there are no issues there.

However, the major problem is that neither board has the PCI v2.2 slot required for his ASUS Xonar Essence XT sound card. If this is a non-negotiable, we need a different option. The only other available mini-ITX board we could find is Gigabyte's GA-H61N-D2V. It's not exactly new, but you can pick one up for around $80 online through **www.staticice.com.au**. Being an older H61-chipset board, however, you'll need to use 1.5V DDR3 RAM and you only get DVI video output, no SATA III and no USB 3.0 ports. Added to that, the lack of a PCIe x16/x8/x4 slot means there's no way to add any other graphics option or native HDMI output (a DVI to HDMI cable will at least solve the latter). On the upside, the board will run the Core i5-3570 processor with no dramas.

While this H61-chipset solution will work, my personal preference would be to go for the P8H77-I board and purchase the ASUS Xonar Essence STX, which is essentially the PCIe version of the ST. It uses the same DAC and ADC with exactly the same audio specs. The only difference between them is the PCIe x1 edge connector on the STX, which ASUS says is also compatible with PCIe x4, x8 or x16 expansion slots. It seems a waste to ditch the Essence ST card, but I personally couldn't live without USB 3.0 ports. Problem is, the STX costs another $170. Other than that, whatever the choice, the Noctua NH-C12P HSF Romek is using (with the LGA1156 bracket) should fit any of these LGA1155 boards.

PROCESSOR

Given our design requirements, we don't need an overclockable CPU here. So in terms of bang for buck, the Core i5-3570 at around $210 is about as good as it gets. The overclockable Core i5-3570K will cost you another $30 or so, but you'll need the P8Z77-I Deluxe board to make a go of its unlocked capabilities.

MEMORY

Again, there's no need to go berserk here in terms of RAM speed. The best-value option is 8GB of DDR3-1600 RAM for around $50. There shouldn't be any issues with using 1.5V or 1.65V RAM on either ASUS board. If you go with the Gigabyte H61 board instead, the RAM will need to be 1.5V rated, not 1.65V. You could save $15 or so by going with DDR3-1333 RAM instead, but really it's a case of either/or. The only issue is that because all three boards have only two DIMM slots, whatever RAM you install now will

ASK US!

Looking to make your perfect PC, but not sure what parts to buy? Every month, our PC expert Darren Yates solves a readers' PC building quandary. Email us at contact@apctest.com for your chance to get building!

need to be replaced later to upgrade – you won't be able to simply add more memory because there won't be any empty slots left.

STORAGE

Romek plans to keep his Samsung Blu-ray drive and 320GB Western Digital Black hard drive, but wants a new SSD to boot from. Given his app load is already 60GB, we're looking for least at 120GB, ideally 240GB. If you can stretch the budget to $260, we'd highly recommend the 256GB OCZ Vertex 4 SSD, as it comes with a five-year warranty and very good performance at a comfortable price. If you're looking for something more affordable, the 128GB version sells for as little as $110 from online retailers such as **www.mwave.com.au**. Personally, I'd go for the 256GB version if at all possible, particularly if you want to use Intel's Rapid Start Technology to boot your system in as little as a few seconds. This takes up space, which you won't have as much of if you go for a 128GB drive.

OTHER POINTS

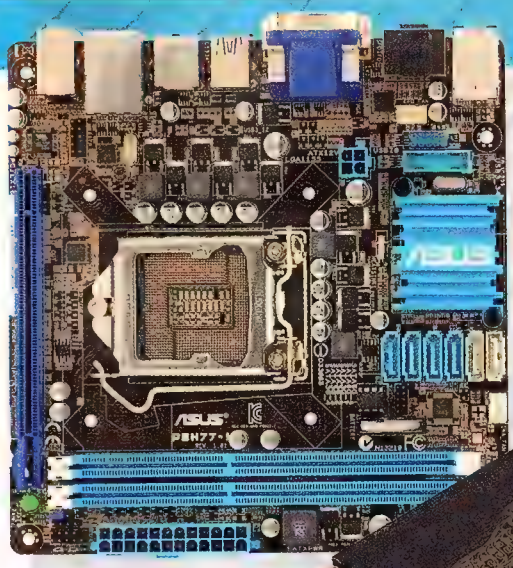
The 450W Corsair VX450W power supply Romek also wishes to retain should fit comfortably inside the Prodigy chassis. What's more, it'll be enough to run this system, given that there'll be no additional graphics card to power.

The only other point of note is that while you should be able to transfer your Windows 7 operating system licence over – yes, it's a grey area, but provided you haven't used it five times previously and you're not using it anywhere else, it should work – the bigger issue is which version to use. Ideally, this should be a 64-bit version of Windows 7, not 32-bit. You'll need the 64-bit addressing to utilise the whole 8GB of RAM, as 32-bit versions can only access around 3.25GB.

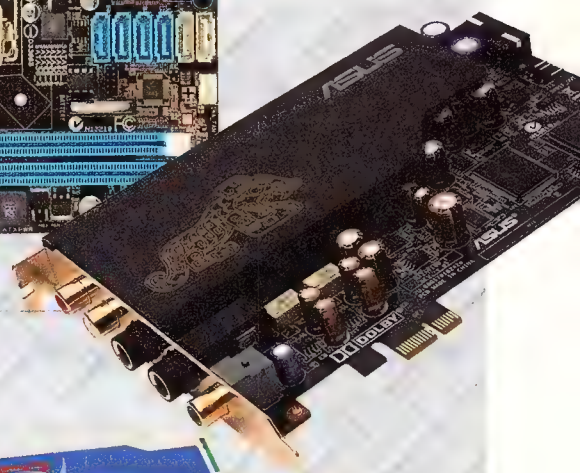
BUILD COST

Now, we've definitely hedged our bets on this upgrade, no question, which means the build cost is a bit all over the shop. To make it easier, we've put a number of alternative options on the table in a sort of 'mix and match' lineup. As you can see below, depending on the options you choose, you can easily double the cost of the upgrade without breaking a sweat. The prices we've used come from **www.mwave.com.au**, which is one of the cheaper retailers, but there are cheaper again if you want to go harder.

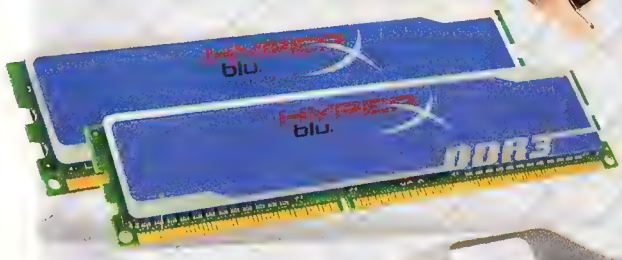
Which build you choose depends on the features you want, but I'd personally go with build #2. Even if I had an ASUS Xonar Essence ST sound card, the lack of USB 3.0 ports would drive me barmy and with mini-ITX there's bugger-all option of upgrading to USB 3.0 later without chucking the motherboard. The P8Z77-I Deluxe adds some cool extras, but it'd be a waste of $120 if you're not going to use them.



ASUS's mid-range P8H77-I motherboard lacks a PCI expansion slot.



To get USB 3.0 support, the PCIe version of ASUS's Xonar Essence ST board is a must.



8GB of DDR3-1600 RAM will do the job, just beware the voltage on older boards.

BitFenix's Prodigy is a great-looking, nicely priced mini-ITX case.

OCZ's 256GB Vertex 4 SSD is our storage weapon of choice.

MINI ITX SYSTEM UPGRADE OPTIONS

	BUILD #1	COST	BUILD #2	COST	BUILD #3	COST
CPU	Intel Core i5-3570	$210	Intel Core i5-3570	$210	Intel Core i5-3570	$210
Motherboard	Gigabyte GA-H61N-D2V	$80	ASUS P8H77-I	$129	ASUS P8Z77-I Deluxe	$245
RAM	8GB DDR3-1600	$50	8GB DDR3-1600	v50	8GB DDR3-1600	$50
SSD	128GB OCZ Vertex 4	$105	256GB OCZ Vertex 4	$220	256GB OCZ Vertex 4	$220
Case	BitFenix Prodigy	$95	BitFenix Prodigy	$95	BitFenix Prodigy	$95
Sound card	(existing)	N/A	ASUS Xonar Essence STX	$170	ASUS Xonar Essence STX	$170
Operating system	(existing)	N/A	(existing)	N/A	Windows 7 Home Premium (64-bit)	$100
	TOTAL COST	$540	**TOTAL COST**	$874	**TOTAL COST**	$1,090

Intel's Core i5 3570, the best-value chip for non-overclockers.

END TO END AMD

Are AMD's CPUs really the weak link we've been led to believe? Jeremy Laird investigates.

The time has come to give AMD another chance. Chuck out all your assumptions. Forget everything you've learned or read about its products. In short, make today ground zero for your relationship with the world's alternative CPU supplier, and the only company that can flog you the complete end-to-end package of a processor, motherboard chipset and performance graphics.

We're not talking about turning AMD into a charity case, and this isn't about making big allowances, though anything that keeps AMD afloat and ensures there's more than one player in the processor market is extremely welcome. It's about focusing on what really matters when it comes to PC performance and value for money. It's about not being distracted by often arbitrary benchmark results. It's about building a PC based on what it will actually do, not how it compares to something else.

The first assumption we want to challenge is that AMD's processors are the weak link. There's no question that Intel's chips are faster, but does that matter? For several years, Intel has been sandbagging its mainstream processors, so it clearly thinks there's only so much CPU performance you need.

A big part of this process is to revisit AMD CPUs in the context that matters to us: games. The thing about games is that you need a minimum level of performance, but don't benefit much from large multiples of that. In other words, dropping below a certain frame rate is very bad, but whether you have twice or 10 times that rate is fairly inconsequential. If you've got a bit of a margin, that's fine.

Moreover, as soon as you shift the emphasis to what's good enough rather than what wins in benchmark fisticuffs, you can take a much more balanced view of configuring your system. Suddenly, the merits of going end to end with AMD and pairing good enough CPUs with excellent GPUs might make sense.

It's a bold experiment. Maybe it won't work and AMD's CPUs are the weak link after all. However, with Intel locking down features and locking out the joy of ownership, it's got to be worth a try.

Since we're asking you to reboot your relationship with AMD, it's only fair if we come clean, too. We've probably been too keen to beat the Intel drum when it comes to PC performance. That's not because Intel doesn't make the fastest CPUs. By any sane and objective measurement, Intel's chips are the quickest and the most powerful you can buy for a PC. We haven't been wrong about them in that sense.

Put another way, the problem isn't that Intel doesn't make great products. It does, but almost everything about the way it markets and sells the things stinks. What's more, simple and objective measurements of raw CPU performance are only one part of the story here.

Intel itself has tacitly conceded that CPU performance has become a non-issue. That's why its mainstream processor models have topped out at four cores for the last four generations. There's only so much CPU performance most people need and a modern quad-core chip does the job just fine. That's why Intel's six-core PC processors are really server chips that in turn require a silly, overly complex server platform.

OK, it's not hard to think of a situation where sheer CPU grunt makes all the difference. If your PC's chief workload is crunching high-quality video encodes, you want to throw as much money at the CPU as humanly possible. But be honest: does that really resemble how you usually use it?

A more realistic scenario involves a pretty mixed bag of applications and software, and if you're anything like us, quite a lot of games. Suddenly, the whole question of how you should specify your PC becomes more nuanced. How should you balance CPU and GPU in your overall budget? Are you gaining or losing from an overall platform perspective?

JARGON EXPLAINED

CPU cores. If you think you know what a CPU core is, think again. The issue involves both AMD's Bulldozer architecture and Intel's use of Hyper-Threading. The result is a maximum of eight threads. Intel achieves that via four traditional cores, each with the ability to crunch two threads. AMD uses funky processor modules that have shared floating point units, but a pair of integer units. Either way, a core ain't what it used to be.

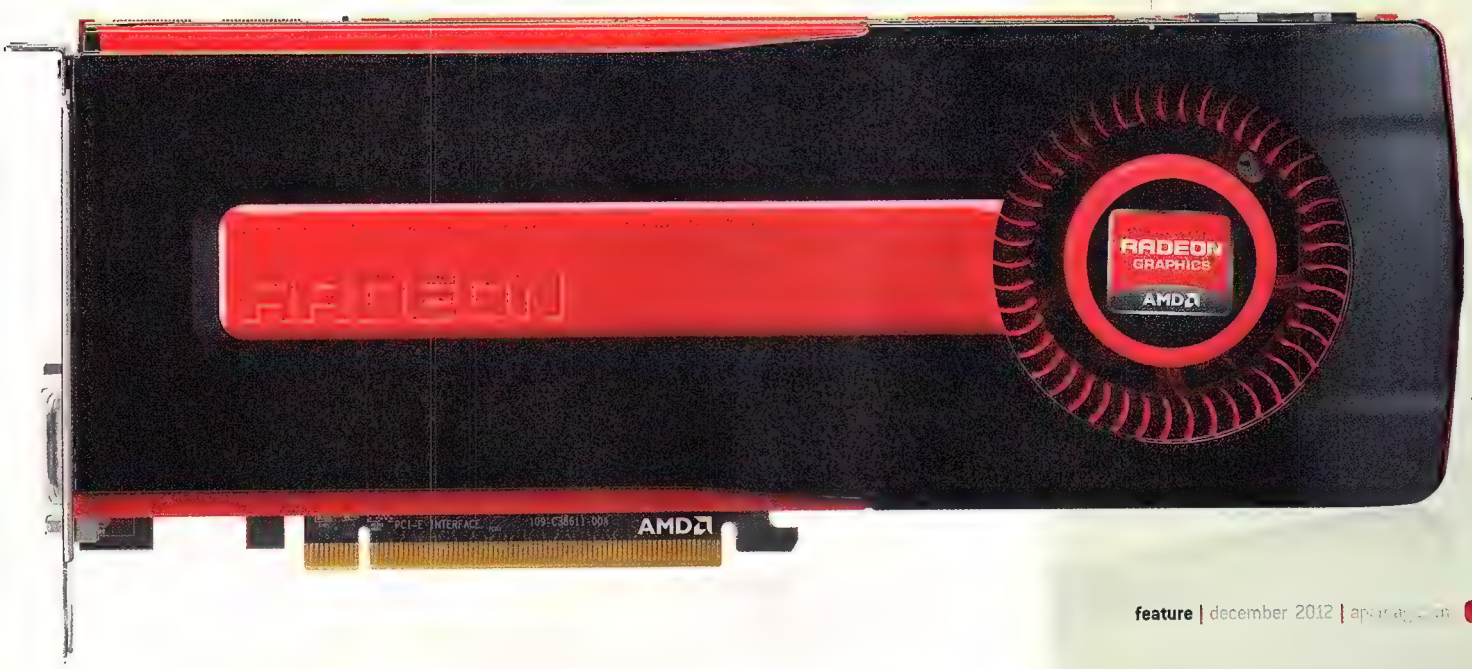
Things get even more complex when you throw Nvidia graphics into the mix. In fact, the latest Kepler generation of Nvidia graphics chips are a great example of how certain assumptions can distort the market. But we'll come to that in a moment.

First, let's revisit the pros and cons of AMD's current processors and have a little think about the reasons why they've fallen so far out of favour. Much of it comes down to expectations that work on many levels. For starters, the computing industry has us trained into a state of perfect – you could say Pavlovian – expectation. Either Intel or AMD rings the bell of a new generation of chips and we all drool in anticipation of mighty performance gains. Anything else is seen as a rank failure.

We don't just want a new chip to be better overall – we're offended if it seems to fall short in any area and we're offended if it's not the fastest thing out there. Therefore, AMD's FX processors based on the Bulldozer architecture received a frosty reception at launch. Overall, it's a step forward over AMD's Phenom II CPUs, but it's still a long way off Intel's finest.

Its greatest sin was to be slower in some areas – most notably single-thread performance – than its Phenom II progenitor. In the context of PC technology, any sort of step backward is awfully hard to stomach, but a new processor that was slower at crunching a single thread of code? Entirely unforgivable.

This month, we want to comprehensively reassess that assumption and reboot the thinking process because what matters isn't performance relative to Intel. What actually matters is whether



AMD's CPUs may be slightly sluggish, but its recently refreshed Radeon HD 7970 is a champion graphics chip.

DiRT: Showdown was the first PC game to use global illumination.

SEEING THE LIGHT

When it comes to games, lighting quality matters. Realism, ambience, mood – you name it and lighting is one of the best ways to achieve it. In fact, you could take something properly ancient like the original version of *Half-Life*, do nothing more than upgrade the lighting, leaving all the models and textures alone, and the end result would be a dramatically more contemporary look and feel.

As it happens, occasionally shonky lighting and shadows are probably the weakest graphical aspects of *Black Mesa*, the home-brew update of *Half-Life* using the more advanced Source engine. The human brain is just so very keyed in to the quality of lighting. But we digress. The point we're making here is that lighting matters, right?

That makes the performance comparison between AMD and Nvidia graphics chips when using global illumination particularly intriguing. It really shines a light (pun intended) on their opposing architectural philosophies.

For the uninitiated, global illumination is probably best thought of as a halfway house between old-school rasterisation with pre-baked lighting and point sources on the one hand, and full-on ray tracing on the other. It takes into account things like reflectivity to build a more realistic overall lighting solution, and it's computationally intense.

Crucial here is Nvidia's decision to go computationally light with the new Kepler generation of GPUs. That choice has made cards like the GeForce GTX 680 remarkably efficient when it comes to more traditional graphics processing. In turn, that has allowed Nvidia to sell a mid-sized chip at flagship prices. Kerching.

Now, we wouldn't want to overstate the importance of global illumination. Until *DiRT: Showdown* arrived earlier this year, there weren't actually any games that used the technology. And like a lot of other graphic extras, it's easy enough to simply switch off.

But it's just possible that a few years from now we'll look back at global illumination as a harbinger of things to come. By then, Nvidia will have new GPUs, which will no doubt address such weaknesses, but that won't help owners of Kepler cards much. It's something to think about when you're building your PC today.

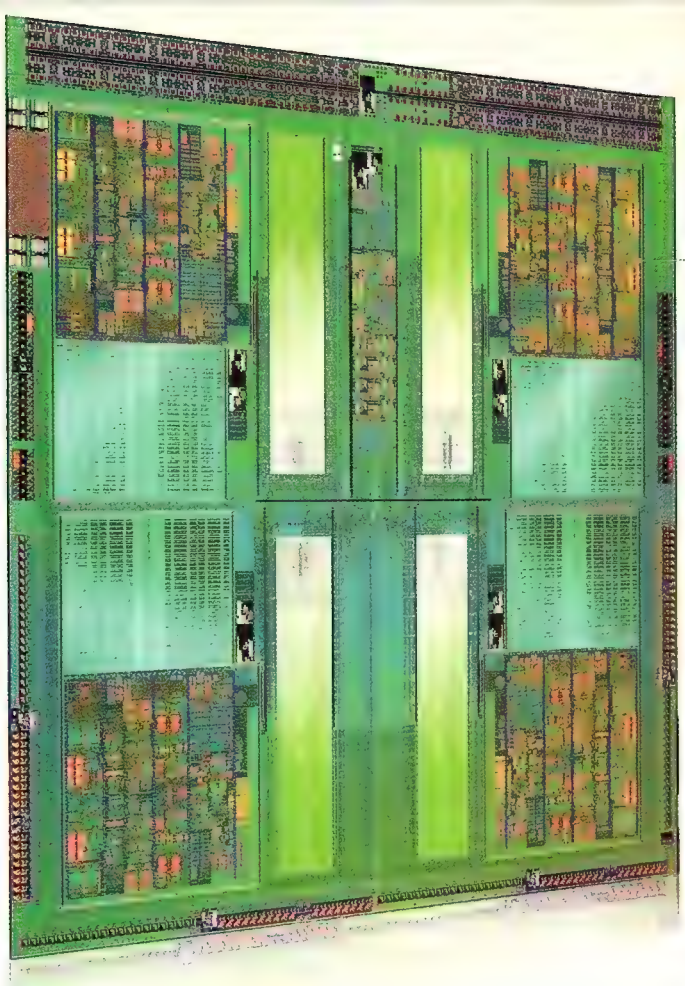
AMD's chips are good enough. If they are good enough, we can then begin to look at all the other factors, such as pricing and platform comparisons.

CONSUMER FRIENDLINESS

Without doubt, there are plenty of reasons to like AMD chips. These include AMD's support for existing customers by maintaining socket compatibility for as long as humanly possible. It just gives you more options when it comes to upgrading either your CPU or motherboard.

The way Intel does things – particularly with the transition from LGA1156 to LGA1155 – sometimes seems like change for change's sake; a cynical ruse to force you to buy a new motherboard and CPU together. Don't forget, third-party chipsets no longer exist, so any Intel motherboard you buy means money trickling into its coffers.

Better than you thought? AMD's oft-maligned FX processor.



Inside AMD: despite its advanced modular design, AMD's Bulldozer microarchitecture has taken a beating from the media.

System on a chip: like smartphones, PCs will soon be based on unified SoCs.

Likewise, it's nice to have full ownership and control of the product you just paid handsomely for. Increasingly, Intel is locking out access to features and functionality depending on the price. Therefore, some dual- and quad-core processors have Hyper-Threading switched off, despite it being there in the hardware, and all but Intel's K series and Extreme Edition processors, have mostly locked or entirely locked CPU multipliers, putting the kibosh on overclocking. Meanwhile, all AMD FX processors are fully unlocked and there aren't any features that have been hidden away for marketing reasons.

On the graphics side, of course, it's Nvidia that's providing the uncomfortable comparisons. AMD has generally been a lot more competitive when it comes to pumping pixels than it has crunching raw code, but there's still been the odd dropped ball, such as the Radeon HD 2000 and, to a lesser extent, 3000 series. The association with AMD's ailing CPUs hasn't helped the branding effort either.

That only looks worse when the competition seems to have the edge. When Nvidia's GeForce GTX 680 (the first card from the new Kepler generation) appeared, it seemed like there was something unnatural going on. Here was a relatively compact graphics chip with a transistor count much lower than we were expecting from a new flagship GPU at the time, and yet it had the measure of AMD's larger, much more complex Radeon HD 7970 in the benchmarks.

As it happens, the situation mirrored the comparison between AMD's Bulldozer chips and the Intel Core family of processors. In both cases, AMD's technology looked bloated and inefficient next to the competition. Perhaps that's why Nvidia's explanation for the performance of Kepler cards seemed so plausible.

In any case, it combined with that well-established shortfall on the CPU side to give the impression of AMD as an also-ran. Given the choice, you'd pick Nvidia. The explanation for the efficiency of the Kepler generation seems plausible enough, too. This time around, Nvidia has focused on maximising graphics performance to the detriment of general-purpose workloads running on its GPUs, otherwise known as GPGPU, so a whole hunk of transistors can be chucked out without hurting games performance.

That's the theory. The problem is, graphics performance is an awful lot more nuanced than CPU grunt. Broadly speaking, you can get a good idea of CPU performance with just a few tests and it's unlikely you'll uncover anything nasty and surprising down the road. For the most part, that's because CPUs are general-purpose items.

Yes, there's some separation of workloads when it comes to integer versus floating point performance, and some architectures can get caught out by things like cache performance and memory bandwidth, which will only show up in certain applications. On the whole, though, CPUs are as CPUs do.

Not so for graphics. The key difference is that GPUs are still effectively fixed-function processors. Programmability has increased enormously compared to chips of a decade ago, but you'll still find things like texture units, rasterisers and render output units in modern GPUs. What's more, even the most highly programmable units – the stream processors – aren't general purpose to anything like the extent of a CPU core.

INTEGRATED ONSLAUGHT

Yep, Intel's CPUs are a bit faster than AMD's efforts, but that's nothing compared to the monumental, intercontinental-going-on-intergalactic gap in graphics performance between Intel's integrated graphics and the best GPUs you can buy from AMD.

If you had to stick with a single vendor for your components, it would be a bit of a no-brainer, but for how much longer? In the long run, we're expecting PCs of all kinds to move towards the system-on-a-chip (SoC) philosophy that already dominates smartphones and tablets.

For that to happen, Intel has to come up with properly competitive graphics, but there are signs that it's finally getting its act together. The Haswell generation of Intel CPUs, due next year, should be at least twice as fast as its current chips for graphics grunt.

That's still miles behind a top-end AMD GPU, but give it a couple more generations and it's easy to imagine Intel graphics being 'good enough', just like AMD CPUs today.

For Nvidia, things are more complicated. It doesn't make x86 CPUs, so the assumption is that the choice will eventually come down to AMD and Intel SoCs with Nvidia entirely marginalised. However, Nvidia is acutely aware of that possible future, hence its increasing efforts with the alternative ARM CPU. At the same time, Microsoft is also treating ARM much more inclusively with a fully ARM-compatible build of Windows 8 on the way.

It's not yet clear exactly how this all plays out in the meantime, but with any luck, 10 years from now we'll all benefit from fierce competition and a choice of three great SoCs in our PCs. One thing's for sure, though: by then you'll almost definitely be playing games on integrated graphics. In a roundabout sort of way, perhaps it's Intel's graphics and not its CPUs that AMD has to worry about.

AMD'S STEAMROLLER ARCHITECTURE

If AMD's current Bulldozer architecture, as found in the FX processors, was a bit of a bummer and the upcoming Piledriver revision probably won't make a dramatic difference, what about Steamroller? Due out some time in 2013, it's the first really major overhaul of the somewhat troubled Bulldozer CPU architecture.

It's ironic in this age of alleged multi-threaded munificence that it was in fact old-school single-threaded throughput that let Bulldozer down. But then, mainstream PC processing has pretty much levelled off of late, at eight threads from both of the major players.

In that context, the really big change with Steamroller is the switch to independent decode engines for each integer engine in a Bulldozer module. In some ways, that's AMD eating humble pie. After all, the whole point of Bulldozer was supposed to be about clever sharing of architectural components to give a great balance between single and multithreaded performance.

That said, instruction fetch is still shared across a pair of integer units, as is the floating point unit, but Steamroller represents a large and significant step closer to having full-fat cores. The downside of this is more transistors and greater power consumption, but on the desktop, that's more AMD's problem that yours.

At least it would be if Steamroller was going to be built on the same 32nm process as the Bulldozer chips, but instead it will be a 28nm design, neatly offsetting those downsides.

Elsewhere, detailed changes have been made, including larger registers, increased L1 cache and a dynamically resizable L2 cache. It remains to be seen how much practical difference any of this will actually make, but if anything is going to make Steamroller competitive, it will be the improved decode resources. And what if Steamroller doesn't deliver? As one wag on an internet forum recently put it, it will then be followed by the ultimate AMD CPU design, Undertaker, burying the company once and for all. But then self-appointed internet sages have been foretelling the demise of AMD for several years now. We've got a feeling the future is bright for AMD.

The upshot of all this is massively more scope for inconsistent performance, at least in comparative terms. So one GPU might be a monster at calculating pixel shaders at a certain precision level, but be really pants when it comes to tessellation. We don't want to give away too much at this stage, but there are areas where Nvidia's decision to hack out a lot of hardware from the Kepler generation suddenly makes itself apparent where it matters: in games.

LOCKED OUT

The final major piece of the puzzle is the underlying platform – the motherboard and its chipset, in other words. It's both good and bad news that third-party chipsets essentially no longer exist. You'll need an AMD chipset to go with your AMD processor, and the same applies to Intel hardware. Less choice is less confusing, although on the Intel side of the equation it adds to the sense of a lack of competition.

Here again, Intel's awful marketing rears its hideous head. The result? Chipsets with features arbitrarily locked out. For instance, Intel only allows overclocking with certain chipsets. Combine that with the limited number of overclockable CPU models and you find yourself completely backed into a corner when it comes to building an Intel rig, with very little choice over models and prices.

Intel's track record for supporting existing customers is awful, too. It recently announced that it had finally cracked the problem of support for the all-important TRIM command for SSDs used in RAID, and there was much rejoicing. Then we learned the software update would only be made available for the latest 7-series chipsets. We're pretty sure that there's nothing in the hardware to prevent the update being made available for, say, 6-series chipsets. It's just Intel's way.

We're not convinced Intel is really pushing the envelope when it comes to chipset features, either. OK, Intel deserves credit for pushing through PCIe 3.0 on the 7-series chipsets, but why did it take so long to include USB 3.0 natively? And what the rubbery duck is going on with Intel's SATA 6Gbps support?

Here in the cold, harsh light of 2012, you still only get two out of six SATA ports with 6Gbps support with most 7-series chipsets (with the exceptions you only get one). And this in an environment in which SATA 6Gbps, much less the slower SATA II standard, is already holding back performance with the fastest current SSDs.

Meanwhile, AMD has been supporting 6Gbps SATA across the board with many chipsets for the past two generations. Admittedly, AMD has yet to include USB 3.0 support on its mainstream desktop PC chipsets. For now, only its chipsets for the A-series Fusion processors get the native USB 3.0 treatment.

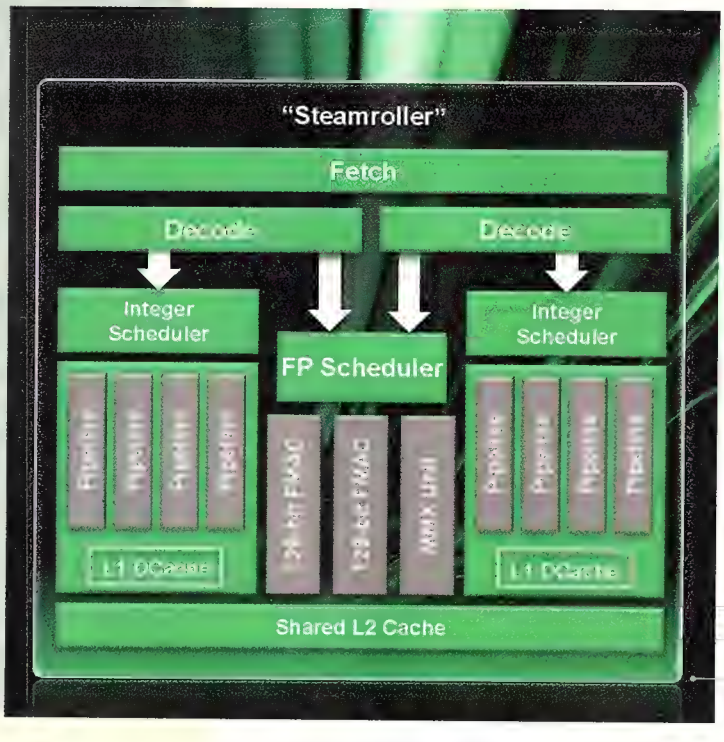
Then there's the end-to-end argument. Much to Intel's chagrin, only AMD can offer a full solution for your PC: a decent CPU, a decent motherboard chipset and decent graphics. Intel still can't do the graphics. That's why AMD has been bigging up the overall platform proposition of late, claiming there's a tangible benefit to running AMD CPUs and GPUs together. Much of the reason for that strategy is the simple fact of the relatively weak links that are its CPUs, but it doesn't mean there's no truth to it.

Ultimately, all of this adds up and all of it matters. For instance, if Intel didn't lock down overclocking to a small handful of PC processors. If it didn't lock down overclocking to certain chipsets. If it supported its existing customers more fully. If it was pushing the envelope of mainstream PC performance and features instead of sandbagging. If it sold its wares based on merit rather than marketing nonsense. If all of that was true, we wouldn't be here, begging you to reconsider AMD. As we've said before, Intel has great products.

But Intel does lock down its products, sneer at existing customers and sandbag on an increasingly epic scale.

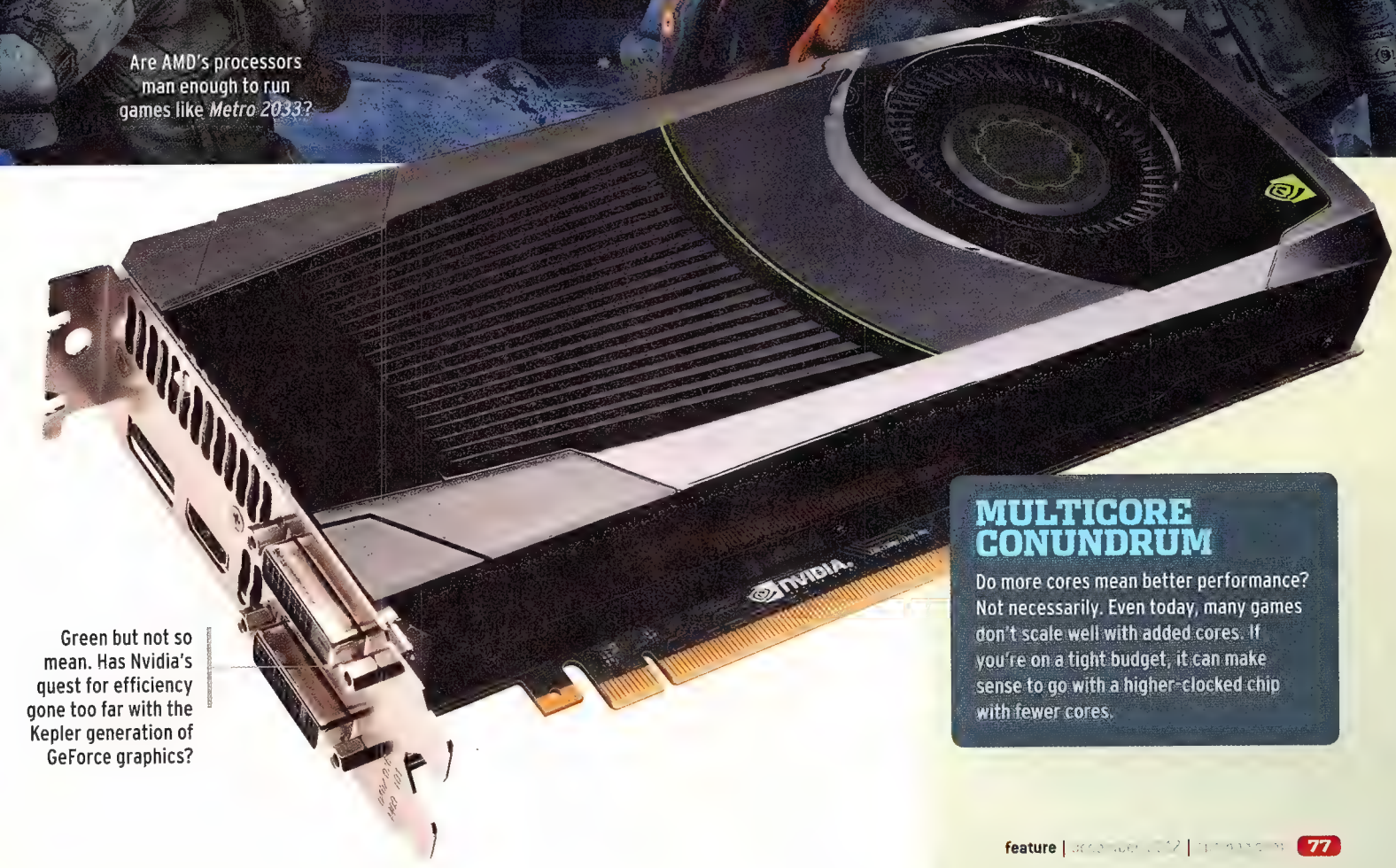
Just as important is the question of whether AMD's processors are good enough rather than how they compare to Intel products. If they are, suddenly there's a very strong case for choosing them.

Admittedly, we're not dealing with any new products here. We've taken four-core, six-core and eight-core versions of AMD's FX chip and matched them with AMD motherboards and graphics. All are well-known quantities, but that's the point – maybe it's our attitudes and not AMD's products that are really in need of a refresh. Let's find out.



AMD's overhauled Steamroller architecture: designed to crush Intel's Core processors.

Are AMD's processors man enough to run games like *Metro 2033*?



Green but not so mean. Has Nvidia's quest for efficiency gone too far with the Kepler generation of GeForce graphics?

MULTICORE CONUNDRUM

Do more cores mean better performance? Not necessarily. Even today, many games don't scale well with added cores. If you're on a tight budget, it can make sense to go with a higher-clocked chip with fewer cores.

WINDOWS 8 FIRST TIPS!

Now that the much talked about iteration of Microsoft's operating system is officially out, you may want to tweak it with some tips and tricks. Ashton Mills investigates.

So, Microsoft's new Windows 8 operating system is officially out. You've played with the various Previews, but it's now on sale and can be purchased for a small sum to upgrade your current system or found shiny and new on a desktop or laptop purchase. And it's just a tad different to what you're probably used to.

In our special feature last issue (see *APC* Novevember, page 34), we not only looked at what Windows 8 meant for everyone from big business to home users, we also provided a handy guide for getting to know a new Windows 8 operating system and how to make the most of it.

All nice, all good. However, what is Windows without tweaking it to your liking?

So this month is our first guide to tweaking Windows 8. There will undoubtedly be more tips and tweaks to come, but the following is a good place to start.

STARTING WITH 'START'

Let's begin with the large, Windows-dappled, elephant in the room: the 'Start' menu is gone. If it's something you were attached to (emotionally or otherwise) it would be rather nice to have it back.

In last month's issue os *APC*, we introduced our very own APC Fix8 tool, which helps automate the installation of either Classic Shell (**classicshell.sourceforge.net**) or Stardock's Start8 beta (**www.stardock.com/products/start8**). Note that Start8 is now out of beta and a paid product, but well worth the paltry asking price of US$5 if you don't like Classic Shell. Another option is ViStart (**lee-soft.com/vistart**), though as we discussed last month, you have to dodge some adware toolbars when you install it.

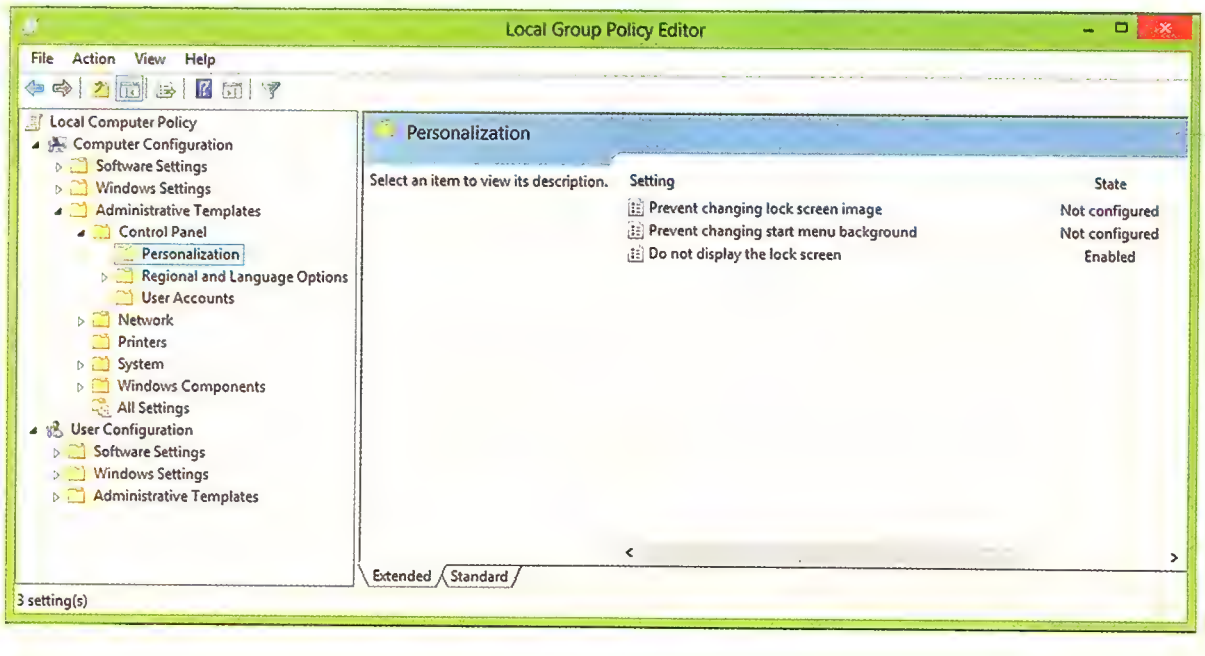
If you missed the last issue of *APC* (are you *crazy*?), you can download our special Fix8 tool from **apcmag.com/fix8.htm**.

UNLOCK THE LOCK SCREEN

A lock screen is nice and pretty for a tablet and all, and perhaps for a little privacy in the office, but for your desktop at home it's a barrier requiring more keyboard or mouse interaction just to use your PC. Save some sanity, time and RSI in your hand by disabling it.

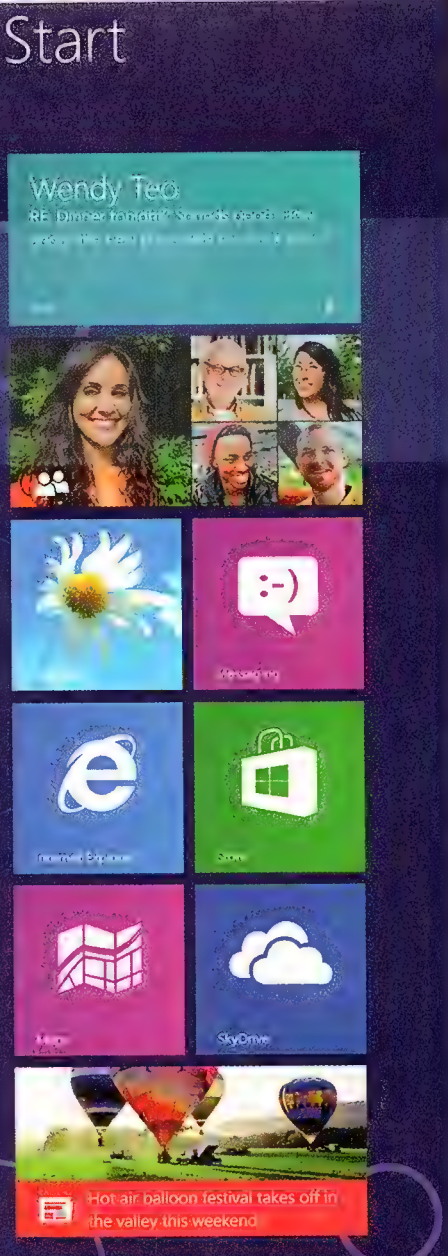
- Tap Windows key+R to bring up the 'Run' dialogue box.
- Type in **gpedit.msc** and press Enter.
- Navigate to 'Computer Configuration > Administrative Templates > Control Panel > Personalization'.
- Double-click on the 'Do not display the lock screen' setting.
- Toggle it to 'Enabled' and click 'OK'.

Of course, you'll still be presented with the login screen, which you may want to keep if more than one person uses your computer. However, if this is redundant for you, it can also be bypassed.



Disabling the lock screen. Nice, but not necessary.

The lock screen is pretty and useful perhaps for a little privacy in the office, and it shows unread emails and calendar appointment.
9:14
Wednesday, February 29



AUTO SIGNON

To automate login and thereby boot directly to the 'Start' screen – or directly to the classic desktop if you've used our Fix8 tool – follow these steps:

- Tap Windows key+R to bring up the 'Run' dialogue box.
- Type in **control userpasswords2** and press the Enter key.
- Deselect the 'Users must enter a user name and password to use this computer' box and click 'Apply'.
- Enter the password for your account.
- Click 'OK' and you're done.

ENFORCE CLASSIC DEFAULTS

Microsoft *really* wants you to like the Modern UI, such that opening files like videos, images or web links take you to the Modern UI app that manages the format, even if you're opening from within the Classic desktop.

Fix this unwanted behaviour like so:

- Hit the Windows key or hover your mouse to bring up the Charms bar and select 'Search'.
- Type in **default programs** and press the Enter key.
- Click on 'Set your default programs'.
- To use the classic Windows image viewer, click on 'Windows Photo Viewer' and then 'Set this program as default'.
- To use Windows Media Player, click on (no surprise) 'Windows Media Player' and then 'Set this program as default'.

For each you'll see the number of total file associations linked to the program change after setting it as default. You can also do this with programs you install; for example, if you've got Firefox or Chrome installed, it should show up in the list and you can simply click these and set them as the default.

As standard, any web links will be opened in the Modern UI's IE, not the classic desktop IE.

PAGE FILE ON SSD

We haven't covered some of the more traditional Windows interface or performance tweaks here, like those you might have used with Windows 7, because for the most part they still work just the same and we wanted to focus on specific Windows 8 tips and tweaks.

One classic tip, however, bears mentioning, especially in the current market where not only are SSDs cheap, they're likely to be found standard on many machines shipping with Windows 8: where to put the page file.

The prevailing wisdom used to be that in order to preserve the longevity of your SSD, the Windows page file should be moved to a traditional spinning-disk hard drive. However, in an MSDN blog post, Microsoft's Michael Fortin makes it clear the page file is ideal for SSDs.

Most page file operations are small random reads or larger sequential writes, both of which are types of operations that SSDs handle well. In looking at telemetry data from thousands of traces and focusing on page file reads and writes, we find that:

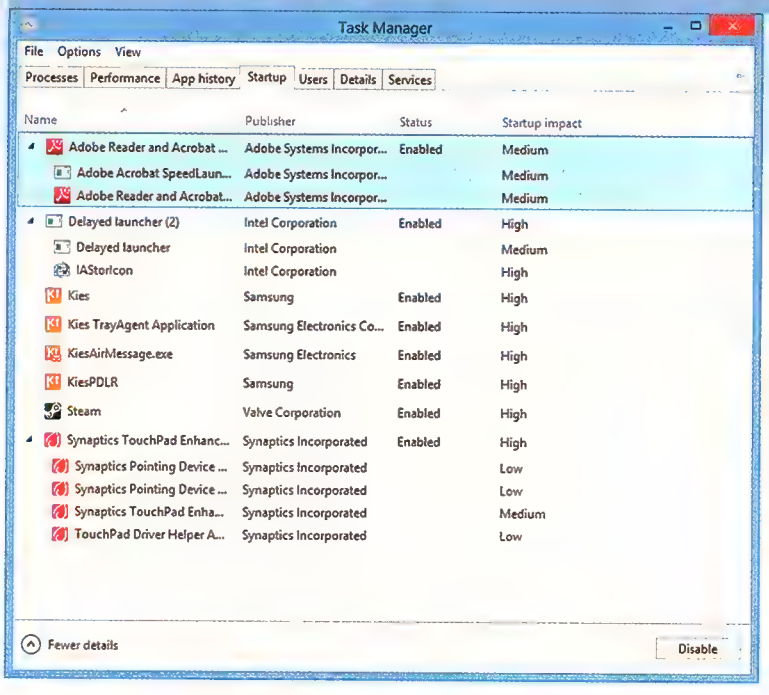
- 'Pagefile.sys' reads outnumber 'pagefile.sys' writes by about 40 to 1.
- 'Pagefile.sys' read sizes are typically quite small, with 67% less than or equal to 4KB and 88% less than 16 KB.
- 'Pagefile.sys' writes are relatively large, with 62% greater than or equal to 128KB and 45% exactly 1MB in size.

In fact, given typical page file reference patterns and the favourable performance characteristics SSDs have on those patterns, there are few files better than the page file to place on an SSD.

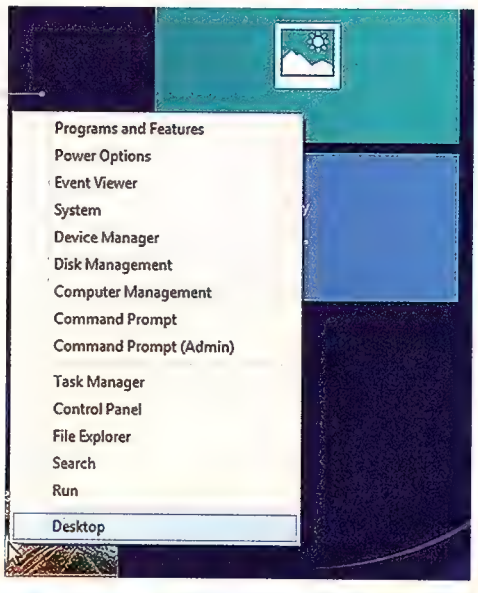
Incidentally, there are no SSD tweaks necessary for Windows 8. The operating system will detect if it's booting from an SSD and ensure TRIM is enabled, it will automatically disable Superfetch (though note Prefetch remains enabled and should be left as such) and will also automatically disable the file content indexing feature.

Importantly, disk defragmentation remains a regularly scheduled service, but this isn't a mistake – the new defrag tool detects if a drive is platter-based or SSD and if the latter, will instead send TRIM hints to the drive during idle periods to ensure the SSD operates at maximum efficiency.

WINDOWS 8 IS HERE!


Task Manager
File Options View
Processes Performance App history Startup Users Details Services
Name Publisher Status Startup impact
Adobe Reader and Acrobat ... Adobe Systems Incorpor... Enabled Medium
Adobe Acrobat SpeedLaun... Adobe Systems Incorpor... Medium
Adobe Reader and Acrobat... Adobe Systems Incorpor... Medium
Delayed launcher (2) Intel Corporation Enabled High
Delayed launcher Intel Corporation Medium
IAStorIcon Intel Corporation High
Kies Samsung Enabled High
Kies TrayAgent Application Samsung Electronics Co... Enabled High
KiesAirMessage.exe Samsung Electronics Enabled High
KiesPDLR Samsung Enabled High
Steam Valve Corporation Enabled High
Synaptics TouchPad Enhanc... Synaptics Incorporated Enabled High
Synaptics Pointing Device ... Synaptics Incorporated Low
Synaptics Pointing Device ... Synaptics Incorporated Low
Synaptics TouchPad Enha... Synaptics Incorporated Medium
TouchPad Driver Helper A... Synaptics Incorporated Low
Fewer details
Disable

No Abobe, I don't need you slowing down my boot.



It looks out of place in the Modern UI, but it's there because it's so necessary.

To change this:

- Press Windows key+R to bring up the 'Run' dialogue box.
- Type in `inetcpl.cpl` and press Enter.
- Click on the 'Programs' tab.
- Under 'Choose how you open links', select 'Always in Internet Explorer on the desktop'.
- Click 'OK'.

You'll notice there's also an option to force IE-based tiles to open on the desktop.

STARTUP PROGRAMS

Some things never change and installing all your favourite programs will still likely see a bevy of unnecessary startup programs and services slowing down your boot. Other things *do* change, however, with Windows 8 actually making it easier to find out which culprits are slowing your system down and preventing them from doing so.

- Press Ctrl+Alt+Delete and select the 'Task Manager'.
- Under the 'Startup' tab, right-click on any program and select 'Disable'.

Neat. There's also a helpful 'Search online' option in the same right-click menu, though it simply passes it through a search engine. For startup services, do the following:

- Press Windows key+R to bring up the 'Run' dialogue box.
- Type in `msconfig` and press 'Enter'.
- Click on the 'Services' tab.
- Finally, click the 'Hide all Microsoft services' checkbox.

For more detailed information on services, launch `services.msc` through the 'Run' dialogue instead. In either case, a level of common sense prevails here – don't disable any service if you're not sure about the impact, as it's possible to render your machine unbootable or cause hard-to-diagnose behaviour if essential services are stopped. This is why the System Configuration tool launched via `msconfig` is safer, as you can hide all operating system services and see only those added by third-party programs.

FILE HISTORY

Last issue we covered how to make a full system backup of a new Windows 8 installation so you can revert to it should you need to recover from a catastrophic failure, but it's overkill when it comes to just backing up important everyday data. For this, File History is ideal and we're including it as a tip because if you're not using it, you should be. Especially as it's so flexible in its use and setting it up takes just a few seconds.

First, decide where you want to keep backups. File History can support a partition on a local hard drive, external USB drives and even network targets. With this in mind, do the following:

- Hit the Windows key or hover your mouse to bring up the Charms bar and select 'Search'.
- Type in 'File History' and click the 'Settings' category underneath the search field.
- Once the 'File History' dialogue is launched, click 'Select Drive' on the left.
- Choose a target drive, which can include partitions on drives, or select to set up a network location.
- Click 'Turn on' to start the first backup.

If you click 'Advanced Settings', you'll be able to specify how frequently File History backs up your files, as well as when to purge old backups to free up space. File History works like Apple's Time Machine and allows you to flick back through previous versions and selectively preview and restore a particular backup from any point in time.

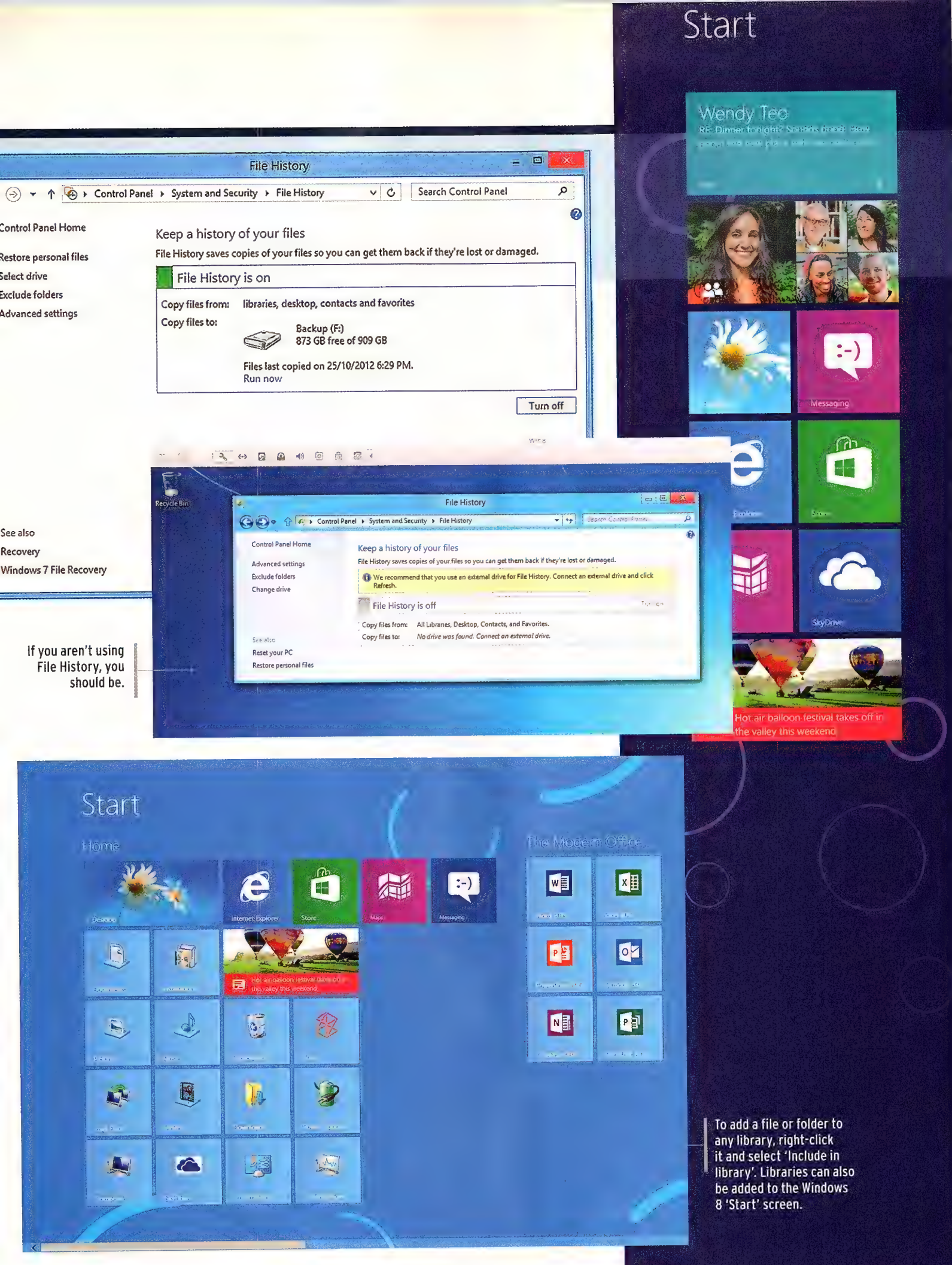
The only thing to remember about File History is that it only backs up predetermined locations: your desktop itself, contacts, favourites and libraries. If you want files backed up from other locations, you have two options: copy them to one of the libraries (these include 'Documents', 'Music', 'Pictures' and 'Videos') or add your own library. Making a new library is easy:

- Open up Explorer (click on the 'Explorer' icon in the classic desktop).
- Right-click on 'Libraries' in the left pane.
- Select 'New > Library' and type in a name.

You can then include any file or folder on your system in the library by right-clicking on it and selecting 'Include in library'. At the next scheduled backup, File History will add the library to its backup.

THE ADMIN MENU

Accessible from both the Modern UI and the classic desktop, simply right-click while hovering the mouse in the lower-left corner brings up the power users menu, aka the Administration menu – giving you access to the 'Control Panel', 'Device Manager', 'Task Manager', 'Disk Management', 'Power Options' and the 'Command Prompt', among other useful tools. For most admin tasks, this little shortcut is a great time-saver.


Start
Wendy Teo
RE: Dinner tonight? Sounds great! Meet
Messaging
File History
Control Panel ▸ System and Security ▸ File History
Search Control Panel
Control Panel Home
Restore personal files
Select drive
Exclude folders
Advanced settings
Keep a history of your files
File History saves copies of your files so you can get them back if they're lost or damaged.
File History is on
Copy files from: libraries, desktop, contacts and favorites
Copy files to: Backup (F:)
873 GB free of 909 GB
Files last copied on 25/10/2012 6:29 PM.
Run now
Turn off
See also
Recovery
Windows 7 File Recovery
Recycle Bin
File History
Control Panel ▸ System and Security ▸ File History
Control Panel Home
Advanced settings
Exclude folders
Change drive
Keep a history of your files
File History saves copies of your files so you can get them back if they're lost or damaged.
We recommend that you use an external drive for File History. Connect an external drive and click Refresh.
File History is off
Copy files from: All Libraries, Desktop, Contacts, and Favorites.
Copy files to: No drive was found. Connect an external drive.
See also
Reset your PC
Restore personal files
SkyDrive
Hot air balloon festival takes off in the valley this weekend
Start
Home
The Modern Office

If you aren't using File History, you should be.

To add a file or folder to any library, right-click it and select 'Include in library'. Libraries can also be added to the Windows 8 'Start' screen.

Experts solve your computing problems

APC and its readers can be one giant helpdesk. If you have a technical problem, chances are one of us can solve it.

MEMORY

ERRORS ON THE RAMPAGE?

Q Five years ago, I built a computer that has performed without problems. I put in an Intel DP965LT 775 motherboard, Intel Core 2 Duo E6700 processor, EVGA GeForce 8800 GTS video card, two Western Digital 500GB drives, two Toshiba DVD drives and two sticks of Crucial 1GB DDR2/667 memory. By today's standards, the machine is ancient, but it has been fine for my needs.

Earlier this year, I decided to boost my memory by adding two 2GB Crucial DDR2/667 sticks to bring my system memory from 2GB to 6GB. The system showed that I had 6GB of memory. Then I started to notice that even though it was noticeably faster, I was having system problems.

Thinking my problems might be related to heat, I started running SIW (System Information for Windows) and found the core temperatures to be high in my opinion. Most readings are between 58 and 65°C, with an occasional peak of around 80°C (This is an air-cooled system with stock fans). I then removed the two new sticks of memory and dropped the system memory back to 2GB. The problems went away, but the temperatures remained in the 58 to 65°C range.

I then took out the original two sticks (2GB total) and put in the two new sticks (4GB total) and the problems returned. Thinking my problem might be the new memory, I ran Memtest86+ overnight twice, with no errors reported the next day. But the problem only occurs with the two new sticks.

I'm running Windows 7 and the problems I'm encountering are that the MMC or Windows Explorer or Windows desktop stops working, or I can't start Outlook 2010. This happens within one to four hours after a cold boot. Most times it's within the first hour. If I then do a reboot, there are no more problems until the next cold boot. I've run the system many days after a reboot without an error. My question is, do you have any ideas what is wrong and how I can fix this problem? I'm guessing it's not a temperature issue since it will run without problems for days after a reboot.

Howard Lewis

RAM ISSUES: If you're having problems, you may need to manually set the RAM timing, voltage and frequency.

A Although most motherboards should be fine with any RAM of the right form factor, speed and capacity, you should always check the RAM you use against the motherboard's Qualified Vendor List (QVL) if you're having memory issues. We're not sure what model of Crucial DDR2/667 you're using, but your motherboard's QVL does list several 2GB DIMMs from that manufacturer at that clock speed, so they should work. Intel also specs the board to run up to 8GB of RAM, so capacity shouldn't be an issue.

Given your trouble, though, it sounds like the new RAM is the problem. You haven't said whether you're running 32-bit or 64-bit Windows, but given the age of your system it's likely you're running 32-bit, which can only address a maximum of 4GB RAM, with some of it consumed by the address space for devices. Running 6GB with 32-bit Windows 7 is bit of a waste, but shouldn't be the problem.

You've tried running the old RAM alongside the new RAM, as well as just the new RAM, but you should also test each individual new piece of RAM to determine if just one stick is bad. If the RAM checks out, it's very possible that the BIOS on the board isn't reading the RAM's Serial Presence Detect (SPD) chip correctly.

The SPD tells the board what frequency, voltage and timing to run the modules at. Normally when you mix and match RAM, the board will set all the RAM to the speed of the slowest RAM you have installed, but it's possible it's just not reading it correctly.

We've seen that numerous times on boards of the LGA775 vintage, but usually on motherboards that play RAM timing settings fast and loose. Intel boards tend to err on the side of stability, but an old BIOS might misconfigure the RAM. Consider updating the BIOS with only the two old DIMMs in place. If you're still having issues, go into the BIOS on your board and manually set the RAM timing, voltage and frequency.

As for your temperatures, they look within reason for an E6700 processor with a stock cooler onboard.

GRAPHICS

MISSING GRAPHICS OPTIONS

Q Recently I upgraded my PC from Windows XP to Windows 7 Ultimate, but I can't find my graphics card options. I have a GeForce 9500 GT and I used to be able to edit my graphics on my XP PC, although with Windows 7 I can't find the options. I know my graphics card is working because it showed up on DxDiag.

Daxpad

A What do you want to 'edit' on your graphics card? The screen resolution? Does right-clicking the desktop not work? If you don't see an entry for 'Screen Resolution' or 'Graphics Properties' on the right-click context menu, you need to reinstall your graphics drivers (**www.nvidia.com**).

If the screen resolution option appears, but you unaccountably want to do something more fancy, click 'Screen Resolution' anyway and then click 'Advanced Settings' on the dialogue that appears. You can get to the

same place from the category view in 'Control Panel' by clicking 'Appearance and Personalization > Display'. There are about six other ways to get there too, but those are the easiest.

WINDOWS

THREAD VALUES

Q When I use Windows Task Manager to check the performance of my rig, the value for threads sits at almost 1,100 and handles are at an eye-watering 27,600. I'm running this on a Core i7 processor with two cores. Why are these values so high?
Damien Lean

A The machine I'm typing this on has 1,004 threads and 20,198 handles right now. And all I have open is OpenOffice.org and Firefox. A thread is just a portion of executable code that's been written to allow it to be run semi-independently of other threads.

They aren't all running simultaneously, Windows just jumps between them as needed and Task Manager shows all the ones that have run recently. All those threads consuming zero CPU time aren't slowing your system down any more than the web pages in your browser history are taking up your attention.

Handles are even less significant. They're just numbers used to identify files or other resources so Windows can refer to them uniquely. There's a table that keeps track of what all the handles are attached to, but it's hardly a big drain on system performance.

In other words: chill.

STORAGE

RAIDING DISSIMILAR DRIVES

Q Is it OK to set two SSDs in RAID 0 if they're using different controllers? I have an older Vertex 2 120GB SSD using the SF-1200 controller and I would like to add a second, more for the extra space on my boot drive than for the performance increase. Would there be any issue using a newer SF-2281 SSD for this? Some people say you should always find an identical component, some say it doesn't matter. I'm looking for a more informed opinion.
Ethan K.

DON'T WORRY:
See all those big numbers in the 'System' section? They're not that big in the scheme of things.

A Technically, you can do it. But should you? Nope. Different SSD controllers utilise their storage in different ways and have different speeds, so we recommend only RAIDing drives with the same model, capacity and firmware. Since any drive failures in RAID 0 cause you to lose the whole array, why add more potential problems? In your case, rather than buying another old Vertex 2, we recommend you get a higher-capacity 6Gbps SATA drive to use as your boot drive and put the Vertex 2 to use as a games or programs drive.

HARDWARE

WI-FI FUNCTION KEY

Q My laptop has various shortcuts for things like turning the volume or the brightness up and down, located on the row of little function keys at the top. Most of these are quite useful but one of them perplexes me: [F12]. Why is there an option to disable the Wi-Fi? This seems as pointless as a button to disable the hard disk or the screen. Occasionally my partner will hit this key combination by accident and then spend several confused minutes wondering why nothing works any more. Is there a way to disable it?
David Patton

A It's not F12 on all laptops. HP mostly uses F12, but Acer sometimes use F5, Dell uses F2 and many laptops have specific buttons or switches that aren't part of the keyboard. What is common, though, is that virtually all laptops have an option to disable the wireless networking. They have this option for two reasons: airplanes and battery life. The former – airlines – insist that Wi-Fi is turned off while you're in the air – and the latter – battery life – greatly prefers that Wi-Fi be switched off.

Is a laptop somewhat less useful without an internet connection? Sure. Is it completely useless without a network connection? No. In fact, the first two laptops I ever owned were never connected to any network more advanced than 'sneakernet' (carrying floppy disks between computers) and yet somehow I struggled on.

The reason that the function keys tend to get repurposed for hardware control functions is because they aren't used for very much else. Some BIOS setups have an option to disable them individually or *en masse*.

Failing disabling the lot, you could just prise the key cap off each one that bothers you. I used to have a keyboard specifically for playing *World of Warcraft* that had the Windows keys removed to stop me from hitting them during the game. APC

CONTACT@APCTEST.COM Share your tech tips

Have you solved a tech problem or found a better way of doing things with your computer? Share your information with other APC readers by sending it in as a tip to contact@apctest.com, together with your name and contact details (details won't be printed). Alternatively, if you have a technical question post it online on our forums at apcmag.com/forums and other readers may be able to solve it.

Better Windows gaming

Take your games to the next level with shader-based image enhancements. Ashton Mills show you how.

YOU'LL NEED THIS

SWEETFX SHADER SUITE

Download the latest version from **tinyurl.com/8kcatcq**.

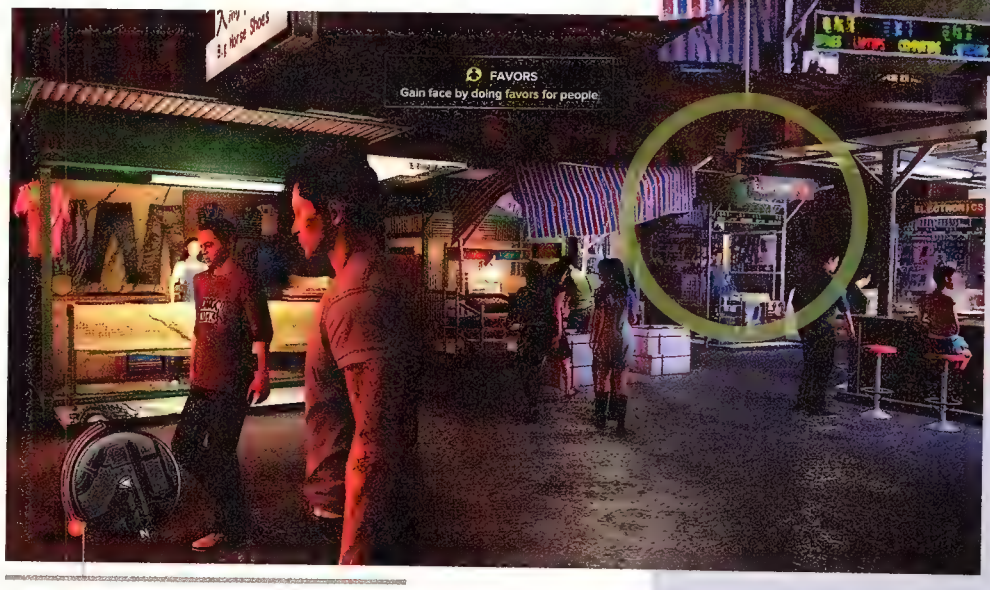
We've previously discussed the use of the FXAA (Fast Approximate Anti-Aliasing) injector to provide decent antialiasing for minimal performance impact, and on almost any game you want to play, including DirectX 11 titles. Unlike the popular and demanding MSAA (Multisample Anti-Aliasing) modes both Nvidia and AMD cards implement at the driver level, FXAA is purely shader-based and operates on the finished rendered image, smoothing out jagged edges for a higher overall image quality as the game is rendered on the screen.

While fast and sporting almost the same quality as 4 x MSAA, there's a downside: because of the way it works, FXAA tends to blur the whole image and can negatively impact the quality of text and UI elements onscreen. Still, considering it has a fraction of the performance impact MSAA imposes, it's an excellent alternative to MSAA when your GPU is struggling to add anti-aliasing in addition to rendering a game.

And while in recent driver updates Nvidia has integrated FXAA as a driver option, the most popular way to use it is via the FXAA injector, which also comes with a host of other handy shader-based image tweaks. These include sharpening, tone map adjustments, colour enhancements and effects like vignette. And best of all, it works with most games. For this reason the FXAA injector has become popular, as it can provide more than just anti-aliasing.

But then came SMAA (Subpixel Morphological Anti-Aliasing), an alternative shader-based anti-aliasing method. While operating the same in principle, SMAA produces superior results to FXAA and importantly, doesn't blur the image the way FXAA does. However the SMAA injector has for some time been relatively basic, providing the ability to use SMAA in a game, but not the host of other nifty image quality features found in the FXAA injector.

Until now.

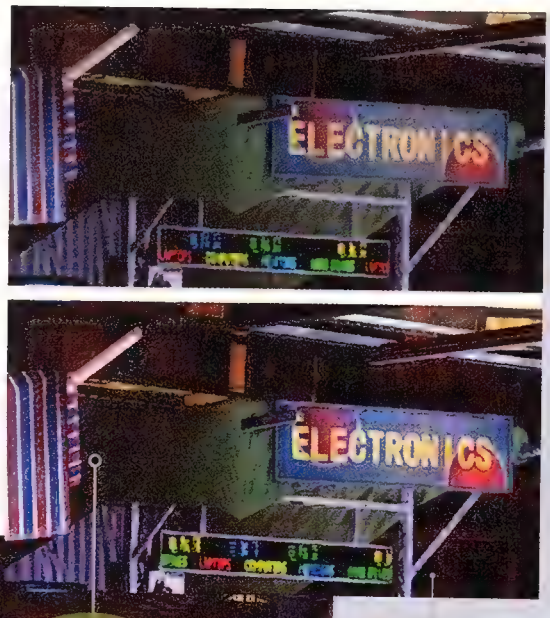


Using SweetFX with *Sleeping Dogs* makes the colourful nightlife of Hong Kong come alive.

JUST ADD SUGAR

One enterprising coder by the name of CeeJay has integrated SMAA with the image effects found in the FXAA injector to produce the SweetFX Shader Suite. He's also gone a step further to enhance the sharpening filter and add other effects like faux HDR (high dynamic range lighting) and S-curve-based contrast.

Originally SweetFX was made with *Skyrim* in mind and can therefore be found at **tinyurl.com/8kcatcq**. However, as an injector it can be used with any game and as a result, has gained in popularity so fast it's become the topic in many a game forum from *Borderlands 2* and *Sleeping Dogs* to the recently released *XCOM: Enemy Unknown* and chart-topping *Dishonored*.



Close-up – the top image is before SweetFX, the bottom image is after. You can see clearer definition and stronger colours, thanks to the sharpen and vibrancy filters.

A snapshot from *Dishonored* – the left image is before and the right is after SweetFX. Notice improved contrast, better shadows and sharper detail, especially in brickwork. The effect in dark areas is even more pronounced, fitting perfectly with the stealth-based gameplay.

The reason is clear: it's simple to use and the improved quality it brings to a game can be jaw-dropping. Once you start using it for one game, you'll quickly find you can't live without it and want to apply it to all the games you play.

INJECTING SWEETFX

First, download the latest release from **tinyurl.com/8kcatcq** and then extract it to the directory for your game where the binaries (.EXE) are stored. For example, this is Borderlands 2\Binaries\Win32 for *Borderlands 2*, or Dishonored\Binaries\Win32 for *Dishonored*.

When you next run the game, it will be automatically enabled, although you can toggle the SweetFX suite on or off in-game by simply pressing the Scroll Lock key. This makes it easy to see what effect the suite is having without the need to restart.

By default, SweetFX only applies SMAA anti-aliasing and the sharpening filter. To use the other effects, you need to open the 'SweetFX_settings.txt' file and edit it accordingly. This is important because there's no one-size-fits-all when it comes to improving the image quality of your game, simply because every game is different. We found that the 'Vibrancy' and 'Tonemap' controls worked wonders along with the sharpening filter to really bring *Borderlands 2* to life, while in *Dishonored* better image quality was achieved by disabling the 'Tonemap' and 'Vibrancy' controls and using the HDR feature instead.

Enabling or disabling an effect is as simple as applying a '0' or '1' to each setting at the top. It's a good idea to enable features one at a time and test how they look in the game, rather than a handful at once, so you can see how each impacts image quality.

For each feature you'll also find a subsection further down in the file. Here you can tweak the strength or potency of features like sharpening, colour vibrancy, bloom and more. To make it easier to see the effects in-game, you can actually alter the file in real time and the injector will apply the effects immediately – so you can launch the game, Alt+Tab to the Windows desktop, alter the file and save, and then Alt+Tab back to the game.

If you don't want to experiment too much for yourself, search game forums for SweetFX and chances are there'll be a thread with others tweaking it to their liking, where you can easily apply their suggested settings to see if you like them, too.

Don't be afraid to tailor these further, though; after all, everyone not only has their own personal preference for what looks good, but everyone's monitor is likely different, too.

LAYERING AA

The SweetFX suite is primarily a means for injecting SMAA, which means you can disable your GPU-intensive in-game or driver-based MSAA and thereby reclaim some performance without sacrificing anti-aliasing quality. That said, as a shader-based AA, if you have GPU power to spare you can leave the standard MSAA modes enabled and run SMAA on top to achieve even higher-quality AA for your game. The beauty of the suite is that it's flexible, so feel free to experiment. apc

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The new Ubuntu

Canonical's twice-yearly release schedule delivering us the latest in Ubuntu goodness is here and we expect 12.10 to be full of the latest goodies. Does it shape up? Ashton Mills investigates.

YOU'LL NEED THIS

UBUNTU 12.10

You can download the operating system from **www.ubuntu.com**.

In our preview look at Ubuntu 12.10 (see *APC* October, page 86), we looked at some of its new features and changes. Now that it's here, not all of them made the cut, so let's see what's new, what's changed and if it's worth your time to upgrade.

DASH

The Dash has seen some of the more significant changes in this release, with a new lens for photos and a rather nifty preview feature: simply right-click on any item from searching in the dash to preview it, be it a text document, movie or music and more.

Additionally, this applies to any content sourced from the web; for example if you search for an artist in the Dash, Ubuntu One Music Store results will also appear in addition to local files and if you right-click on an album, you can play songs directly from the music store.

Applications can also be installed this way, bypassing the Ubuntu Software Center. Simply search for software using the Dash and again, right-click on any of the results.

WEB APPS

Web Apps aim to enable tighter integration between web sites and the Unity desktop. When visiting a site that has web app integration, Firefox will display a pop-up asking if you want to install extra functionality.

Precisely what this entails depends on the site – Gmail will display new messages in the Launcher, while Twitter and Facebook can integrate with the messaging widget in the taskbar, for example.

Supported sites include Facebook, Twitter, LinkedIn, Gmail, YouTube, tumblr, Last.fm, WordPress and Canonical's own Ubuntu One Music Store. This list will expand to add more over time.

UPDATED UPDATING

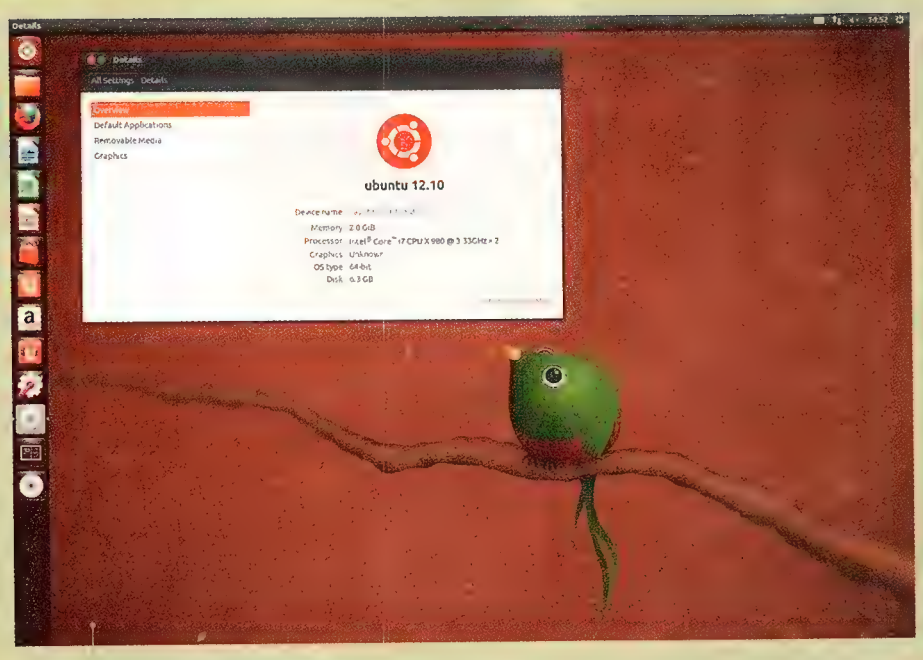
A small yet notable change can be seen in the 'Power' menu, now reorganised with some options taken away and new ones added. You can no longer directly check for updates; instead, you need to click a new 'About This Computer' entry, which displays summary info about your PC, as well as allowing you to set default applications for browsing, mail and music. However, it's on this new dialogue that checking for updates is automatically performed. Alternatively, you can type **update** in the Dash and directly run Software Updater.

The new updater is cleaner and tries to hide some of the confusing Linux output, which is certainly good for new users and those who don't like going commando at the command line, but it's also a little bit less forgiving. After an update, if a reboot is recommended your only choice *is* to reboot. There's no 'later' or 'not now' option so you're stuck with having to save all your work, close any open programs and reboot or put up with a dialogue window showing up in your Alt+Tab list that won't go away until you do.

BINARY DRIVERS

Binary blob drivers no longer get their own dialogue in the 'Settings' control panel. Instead, this has been moved to a new 'Additional Drivers' tab in the 'Software Sources' dialogue box. Functionally nothing has changed, it's more a logical move and consolidation.

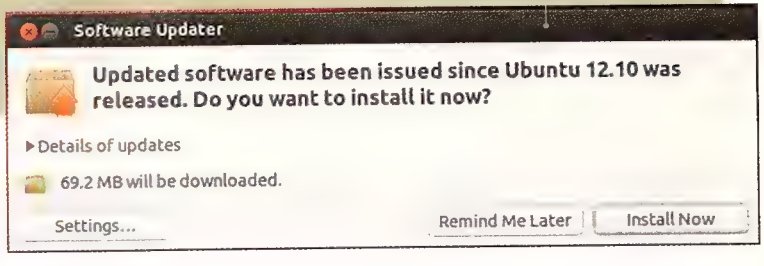
The Dash can search a variety of online sources in addition to the local file system.



A new Ubuntu, a new Ubuntu desktop theme. A range of new wallpapers are included, along with improved widgets for a consistent look and feel.

The new Web Apps feature allows for web site integration directly with the Unity desktop. Here Gmail shows unread messages and clicking it launches Gmail.

The updated Update Manager tries to make installing updates more user-friendly.


Software Updater
Updated software has been issued since Ubuntu 12.10 was released. Do you want to install it now?
Details of updates
69.2 MB will be downloaded.
Settings...
Remind Me Later
Install Now

INTEGRATED PRODUCT SEARCH

Late to the party for this release, Canonical introduced an expanded functionality of its online search with the Dash: Amazon integration. This caused a bit of an uproar in the forums, with claims of Canonical selling out and adding ads to Ubuntu while disseminating search data you type in to third parties. While there *is* an Amazon web link added to the Launcher by default, which is clearly being paid for, it's a bit of a misnomer.

For one, there aren't any ads; instead, actual product results show up on the Dash based on what you type. Secondly, Amazon isn't the only online provider that gets searched – Canonical's own Ubuntu One Music Store is in there too and others may be added soon. Importantly, though, all queries go through Ubuntu's own servers and are passed on anonymously to retrieve search results.

On the one hand, it's understandable that some may feel Canonical is selling out by commercialising Ubuntu in this small way, but on the other, Ubuntu is a completely free operating system. It's therefore hard to begrudge the company trying to find ways to make money, especially if that means the continued development of Ubuntu.

Incidentally, perhaps because the results are region-based, the integrated results for Amazon don't show up for us, while matches for the Ubuntu One Music Store do.

Regardless, you can't imagine this kind of feature being added and having no choice about it, so if you're bothered by it head to 'Settings > Privacy' and you'll see a new 'Search Results' tab where you can toggle the option on and off.

INTEGRATED REMOTE DESKTOP

An interesting new feature is the ability to log in to remote machines from the Ubuntu login screen. If you've previously defined remote desktop machines in your Ubuntu One account, they can appear as entries in the login prompt, so you don't even have to load your desktop to log in to another machine.

CORE PACKAGES

Naturally, there's a new version of LibreOffice, the latest Firefox and Thunderbird released, and of course, a new kernel based on the 3.5 tree. Another big change is the move to Python 3.0, though 2.0 is still supported, with the majority of Ubuntu's components being ported across. The planned changes to the Nautilus file manager we saw in earlier betas, which included a new look, have been reverted – perhaps we'll see them in a future release.

The Ubuntu One application also gets a nice update, with the ability to search files on your cloud storage from within the program and improved sync functionality with the system tray app.

Finally, Unity 2D is no more. Unity 3D, the hardware-accelerated version (using Nvidia- or AMD-based hardware, for example), is the only version of Unity that comes bundled with Ubuntu now. However, older and slower machines haven't been left out in the cold; instead, if hardware-accelerated 3D support isn't available, Gallium software is used instead. It won't be as slick and as fast, although it works just the same and makes it easier for Canonical to maintain just one version of Unity.

All up, it sounds like rather a good upgrade with plenty of brand-new features, but unfortunately, the experience of using Ubuntu 12.10 hasn't been smooth sailing for us. In just the first few days of usage and on a clean install at that, we've had Compiz crashes (the underlying engine that powers the UI), multiple hangs of Unity, which has caused it to restart itself while doing nothing more than searching in the Dash. At one point, we even had a crash with Ubuntu One, simply by signing in to our account.

Speed is also a problem, with the whole desktop feeling a bit sluggish compared to previous releases.

We haven't actually said this before about an Ubuntu release, but it may be better holding off on an upgrade until some of these issues are sorted. Ubuntu 12.10 has the potential to be a great upgrade, but perhaps keeping the regular six-monthly release cycle without fail has worked against it this time.

10 features you're probably not using in iOS 6

Sometimes, it's the little things that make the biggest difference. Jenneth Orantia shows you some new features you may have missed.

YOU'LL NEED THIS

IOS 6

To use the new features here you'll need to update your iPhone to iOS 6. The prompt to do that will be in the Settings options.

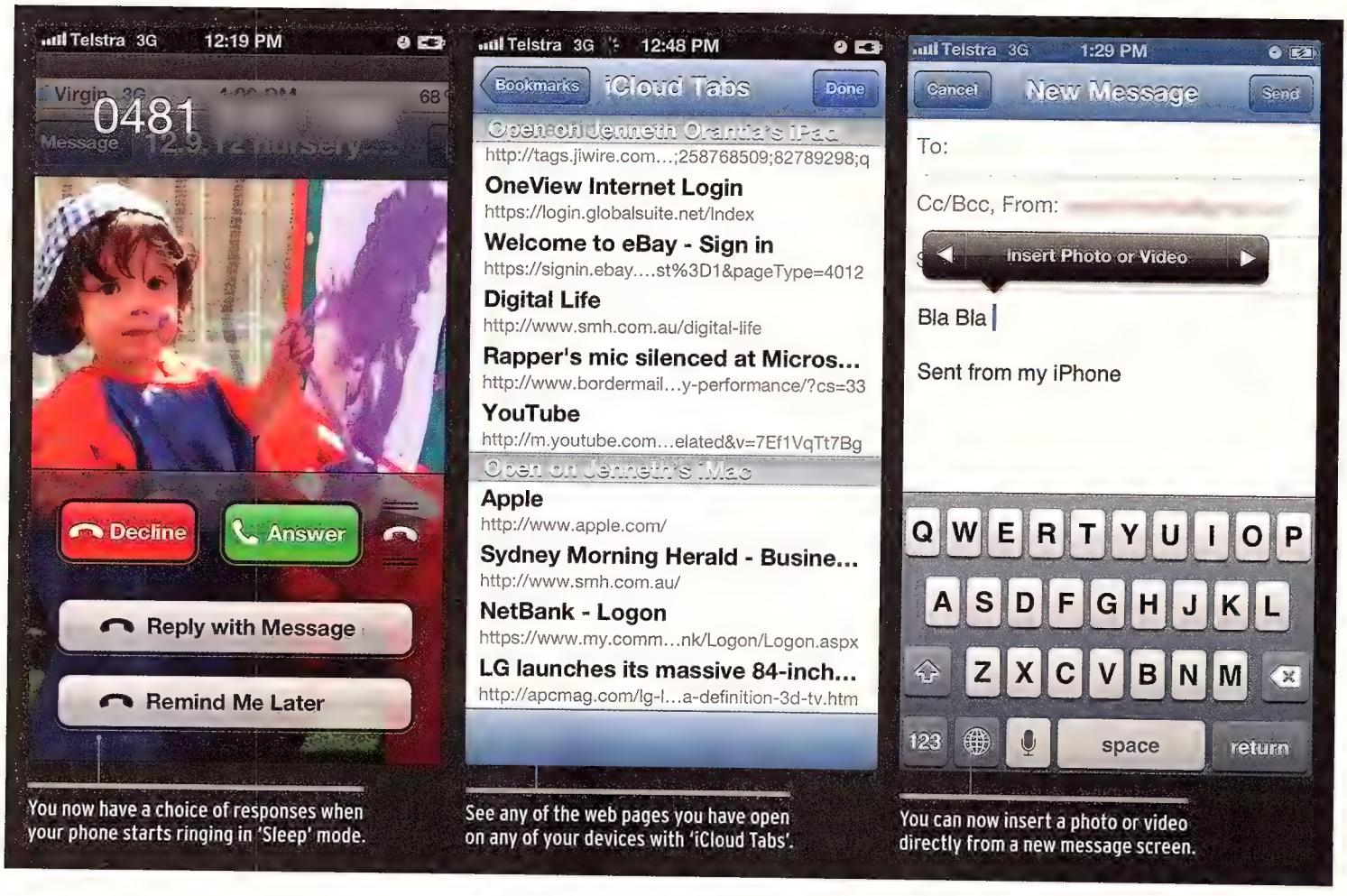
If you've upgraded to the latest iOS operating system, you've probably had a look at the main new features and have scoped out the good ones, like expanded Siri functionality, FaceTime over 3G and Facebook integration for status updates and sharing content, and noticed the not-so-good ones, like Apple Maps and Passbook. But there are lots of little features in iOS 6 that are well worth exploring, too.

If you've ever been jolted awake at night because your phone is beeping over a new Facebook notification/Twitter mention/text message from a drunk friend, you'll love the new 'Do Not Disturb' feature. This goes one better than simply putting your iPhone on mute; it lets you silence your phone completely from any ringing, vibrating, beeping or lighting up to display notifications on the lock screen.

'Do Not Disturb' can be found in the 'Settings'. You can turn it on and off manually from here, or you can set it to turn on automatically at particular times. To set it to a schedule, go to 'Settings > Notifications > Do Not Disturb', turn on the 'Scheduled' option and then specify the hours of the day you want it to be active. You can also set it to allow calls from people in your 'Favorites'. If you haven't added any contacts to your 'Favorites' yet, you can do this from the 'Favorites' tab in the Phone app.

Tired of the stock alarm tones in the Clock app? Apple has finally added the ability to choose your own music to wake up to. When you create a new alarm, tap the 'Sound' option; the 'Pick a song' setting lets you choose one of the songs in your music library.

In past versions of iOS, you've always been able to hit the 'Decline' button to reject a call when your phone starts ringing and you're already using your iPhone for something else. If your iPhone's asleep when the call comes in, however, the 'Decline' option doesn't appear and you may not have even known that you could still decline the call by pressing the power/lock button twice. Apple has now made this easier in iOS 6 and added some extra options.



You now have a choice of responses when your phone starts ringing in 'Sleep' mode.

See any of the web pages you have open on any of your devices with 'iCloud Tabs'.

You can now insert a photo or video directly from a new message screen.

When your iPhone starts ringing from sleep, you can swipe up from the phone icon in the bottom-right corner of the lock screen to see the 'Decline' button, and you can also opt to reply with a message or add a reminder to the Reminders app to call that person back. The 'Reply with a message' option gives you a few pre-written messages to choose from, such as "I'll call you later" and "I'm on my way", and you can select the 'Custom' option to write your own message. You can even create your own pre-written messages by going to 'Settings > Phone > Reply with Message'.

Shared photo albums are a way to share photos with specific people (who are using iCloud on iOS 6 or have a Mac running OS X Mountain Lion) without having to manually send them via email or MMS. If you have kids, this is a great way to share photos of them with grandparents and other relatives without having to broadcast them on Facebook.

To create a shared photo album, go to 'Photos > Photo Stream', click the '+' button and then add the people you'd like to share the album with. Names that are greyed out in the list are the people who aren't using a compatible device. Give the album a name and hit 'Create'. Next, you'll need to add photos to the album. Click on the arrow button next to the album name, tap 'Edit' and then 'Add' – you'll now be able to add photos from your local photo albums and in your photo stream. People who you've added to the shared photo album will get a notification that you want to add them to the album and once they accept, they will get a notification every time you add new photos.

If you use the Safari web browser on other devices, such your PC, Mac, iPad or iPod Touch, the new 'iCloud Tabs' feature lets you see all of the tabs you have open on those devices. This means you can continue your web browsing sessions seamlessly, no matter which device you're using. To see these tabs on your iPhone, click the bookmark icon at the bottom of the screen in Safari. iCloud Tabs will then display all of the pages you currently have open on your devices.

'VIP Contacts' is a feature that Apple has brought over from OS X Mountain Lion's Mail app and it lets you tune your email notifications so that you're alerted in a different way when you get a message from one of those contacts. You may not want your iPhone beeping every time you get a new email, for instance, but if it's from one of your VIP contacts (say, your significant other or your boss), you can set it to beep, to appear in the notification centre or on the lock screen, or to appear as a banner.

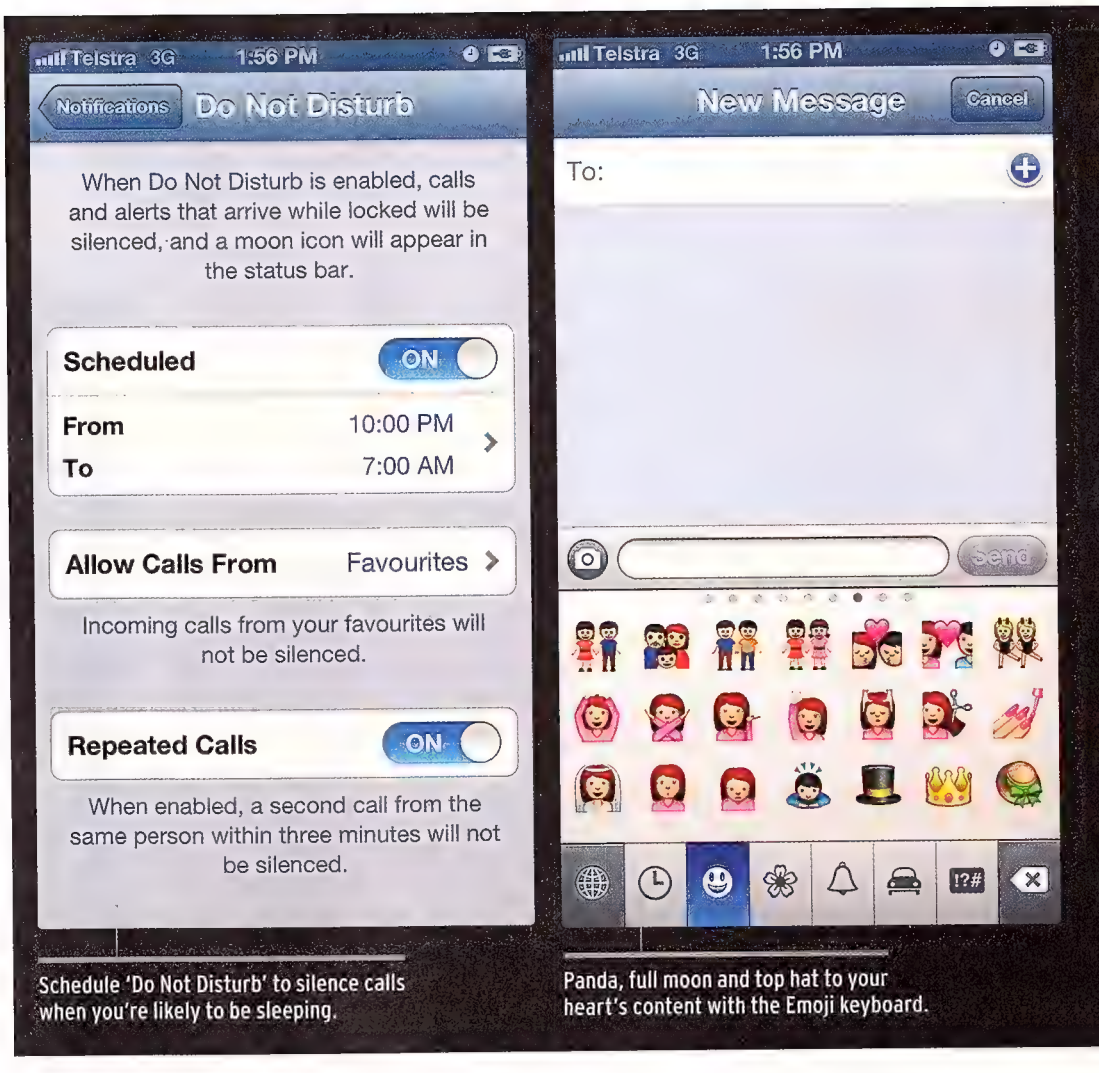
To add a VIP contact, go the Mail app and tap the 'Mailboxes' button at the top to go to the 'Mailboxes' view. Tap on the arrow icon next to VIP (make sure you tap on this precisely, otherwise you'll open the VIP inbox instead) and you'll see an option to add VIP contacts. Only the contacts that have email addresses will be available to select. Once you've added all of your VIP contacts, select the 'VIP alerts' option to customise the notification alerts you'll receive whenever you get an email from one of those contacts.

Love your emoticons? Apple has integrated a whole bunch of new ones into iOS 6 in the Emoji keyboard, which means you don't have to install any third-party apps anymore. If you haven't added this keyboard already, go to 'Settings > General > Keyboard', tap the 'Keyboards' option, select 'Add New Keyboard' and then select 'Emoji'. The next time you're entering text, press the globe icon on the bottom of the keyboard to switch to Emoji and you'll have access to hundreds of emoticons across five different tabs. Press the globe icon again to go back to the regular keyboard.

You may not have noticed in iOS 5, but Apple added the ability to format text in new email messages with bold, italics and underline. iOS 6 adds the ability to insert photos and videos directly from a new message screen (previously you could only do this by sharing the photo or video from the Photos app). Just tap and hold until the toolbar comes up, press the arrow button on the right and select the 'Insert Photo or Video' option.

If you like to fall asleep to music on your iPhone, a new 'Late Night' EQ preset makes your music less 'boomy', so you're not rudely jarred awake when some drum and bass or dubstep track finds its way into your playlist.

Last but not least, Apple has finally added full-screen browsing to Safari, but it's only available when you're holding the iPhone in landscape mode. Turn your iPhone on its side and tap the outward-facing arrow icon to view the page in full-screen. Press that button again to bring the toolbars back.


Telstra 3G 1:56 PM
Notifications
Do Not Disturb
When Do Not Disturb is enabled, calls and alerts that arrive while locked will be silenced, and a moon icon will appear in the status bar.
Scheduled ON
From 10:00 PM
To 7:00 AM
Allow Calls From Favourites
Incoming calls from your favourites will not be silenced.
Repeated Calls ON
When enabled, a second call from the same person within three minutes will not be silenced.
Telstra 3G 1:56 PM
New Message
Cancel
To:
Send
Schedule 'Do Not Disturb' to silence calls when you're likely to be sleeping.

Panda, full moon and top hat to your heart's content with the Emoji keyboard.

Access Netflix on your iPad

Jenneth Orantia gets around region-locking restrictions to access hundreds of new movies and TV shows.

YOU'LL NEED THIS

A US ITUNES ACCOUNT

Your Australian account won't work with Netflix, but it's easy to set up a US-based one.

NETFLIX

Once you have a US iTunes account, download Netflix from **tinyurl.com/8fnnp4j**

The paid video streaming options you can access on your iPad in Australia are a little better than what they used to be. There's BBC iPlayer, if you want to access British TV shows, which will set you back $9.49 a month. Quickflix WatchNow is available for streaming a limited selection of classic and current movies and TV shows, and this is available for $14.99 a month. And there's Mobile FOXTEL, which you can access if you're a Telstra customer, starting from $8 a month.

But none of these services can hold a candle to Netflix, a video streaming service available in the US with a vast range of movies and TV shows on offer. Accessing this service is region-locked to the US, but it's possible to circumvent this with a couple of easy workarounds.

First, you'll need a US iTunes account. Open iTunes on your computer, click 'iTunes Store' and then click on your account name in the top-right corner. Click the 'Sign out' button, then scroll to the bottom right-hand corner of iTunes and click on the Australian flag icon. Select the 'United States' option.

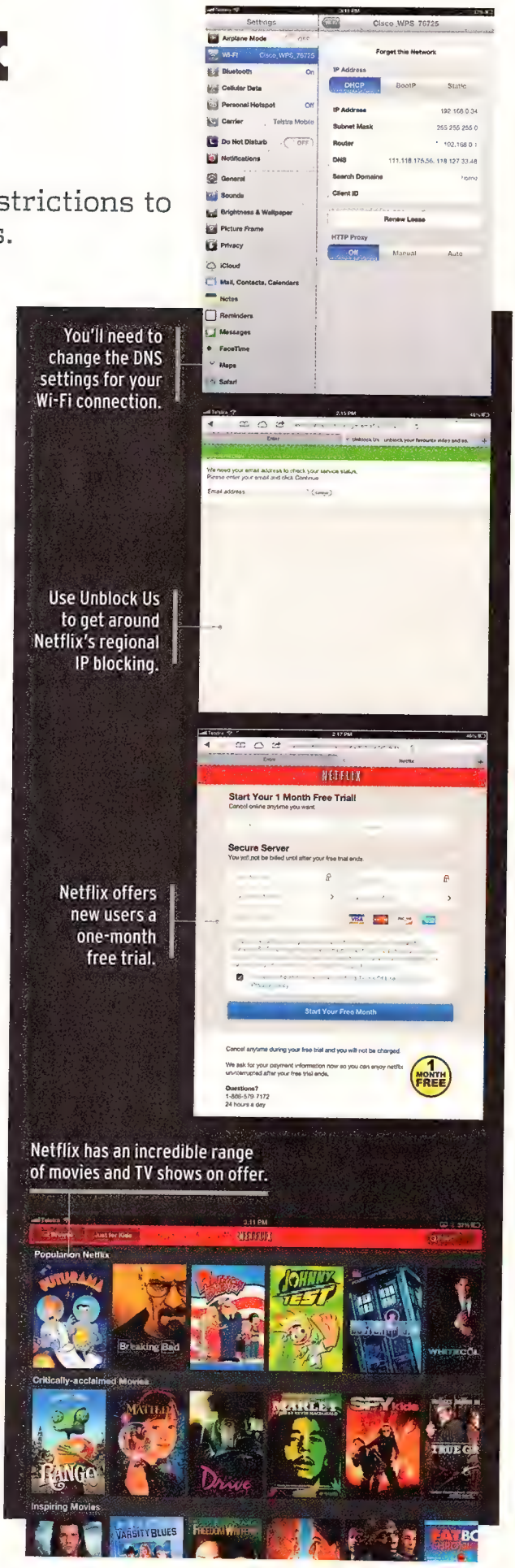
The next step is to download a free app to bypass the usual credit card requirement when creating a new Apple ID. Once you try to download the app, you'll get a 'Sign in' box. Click the 'Create Apple ID' button and follow the prompts until you get to the 'Apple ID Details' screen. Here, you'll need to use a different email address to the one you're using for your Australian ID. Fill in the rest of the details and hit 'Next'.

In the payment method screen, select 'None', then enter a US billing address – any address will do – and click 'Create Apple ID'. A verification email will be sent to your nominated email address and you'll have to click on the link in it to activate your account.

You can then download Netflix to your iPad. Open the App Store, sign in with your new US iTunes account and do a search for Netflix. Your next step is getting around Netflix's regional IP blocking. There are various VPN services you can use for this, but we prefer Unblock Us, which charges $4.99 a month and comes with a seven-day trial. Go to **www.unblock-us.com** and enter your email address to start the free trial.

To configure your iPad to use Unblock Us, you'll need to change the DNS settings for your wireless connection. Go to 'Settings > Wi-Fi' and click on the arrow next to the name of your home wireless network. Tap on the DNS field and replace the values there with '111.118.175.56, 118.127.33.48'. Tap on the Wi-Fi button on top of the screen and your iPad will disconnect and reconnect to your wireless network. Now, open Safari and go to any web site. An 'Unblock 'Us page will open, asking for the email address you used to create the trial. Punch it in, press 'Continue' and Unblock Us will add your network's IP address to its service.

The final step is creating a Netflix account. Do this from your iPad, as Netflix will now think you're in the US. Netflix offers a one-month free trial, but you'll need to enter a credit card to activate it. Luckily, you can use your Australian credit card for this. Create your account and then use those details to log in to the Netflix app. Netflix supports video out and AirPlay, so you can use either to watch Netflix on your TV through your iPad.


You'll need to change the DNS settings for your Wi-Fi connection.
Use Unblock Us to get around Netflix's regional IP blocking.
Netflix offers new users a one-month free trial.
Start Your 1 Month Free Trial
Secure Server
Start Your Free Month
1 MONTH FREE
Netflix has an incredible range of movies and TV shows on offer.
Popularion Netflix
Critically-acclaimed Movies
Inspiring Movies

QNAP

Smart NAS with HD Media Player

Enjoy high definition movies, music, or photos on big screen TV via HD Station

- Play your digital content from PC, Mac, or any DLNA server
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Full HD 1080P HDMI

• Available on TS-x69L, TS-x69 Pro series with V3.8.1 firmware

QNAP Remote

TS-269L

TS-469 Pro

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www.bluechipit.com.au

National
Harris Technology 1300 13 9999

VIC
Scorptec Computers 1300 72 6770
Centre com 03 8311 7600
eStore 1300 658 600
Landmark Computer 1300 133 165
PC Case Gear 03 9560 2122

NSW
Mwave 02 9649 5187
Skycomp Technology 02 9011 2078
Techbuy Pty Ltd 02 9648 1818
CX computer 02 9233 6288
Online computer 02 9211 0898

WA
Ple Computers Pty Ltd 08 9309 4771
Austin Computers 08 9201 2788

QLD
Media Players and More 07 5580 4508
Umart Online 07 33693928
PC Ezy 07 3359 6777
Betta Computer Services 07 3809 2999

SA
CalibreOne Pty Ltd 1300 368 171
ASI Solutions 08 8354 6200
SUBNET 08 7127 9400

Get things done on your handset

Simon Chester organises his life using his smartphone.

YOU'LL NEED THIS

ASTRID

Available on Android, iOS and the web, you can sync your tasks across all of your devices.

The most important part of good task management is storing everything in a single place so that, when you look at what needs to be done, you know that the list isn't missing anything. That single place shouldn't be your mind – it has to be stored somewhere reliable, searchable, filterable and referenceable.

There are, of course, something like a fillion different methods for task-management out there, each using different tools, but, today, I'm going to tell you a simple, yet effective, method that uses the free Astrid client.

I chose Astrid because it's available on both Android and iOS platforms and is accessible from a web interface as well, making it available anywhere. It also features powerful reminders, including location-based (via Locale), recurring and random nags for overdue tasks. It supports multiple users and, well, it's also kind of cute.

While collating your tasks into a single place is the most important part, the next most important part is contextualising your tasks. Each task you create should have a 'when', 'what', 'where' and, if applicable, a 'who' context. This way, you can search or sort by context to find those tasks that are due now, or those that are part of a specific project at work or the ones that are needed when you're at the shops.

You create these contexts by assigning them to lists. Lists in Astrid are really tags, because tasks can exist in multiple lists at the same time. So, the first thing you need to do, after installing Astrid from the Play store, is set up your lists.

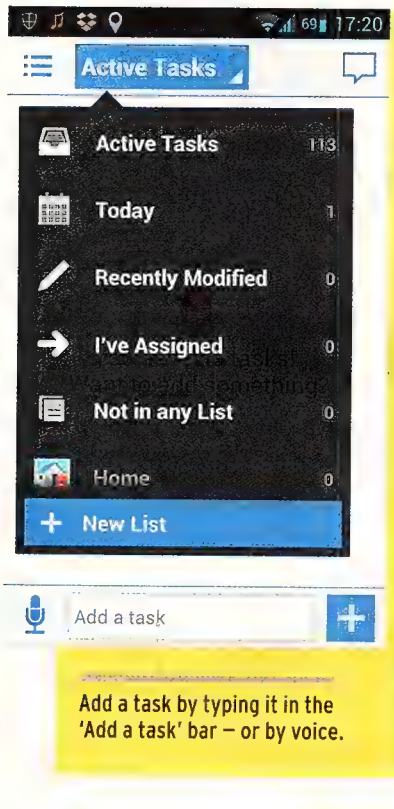
The 'when' context is already taken care of by the in-built priority levels (think of '!!!' priority as 'now', '!!' as next, '!' as soon and '○' as some time), but you should create/rename 'what' lists (for example, .PersonalLife, .JanuaryIssue, .Ideas) and 'where' lists (eg @work, @home, @shops, @pub, @kebabshop). 'Who' can just crop up organically, as it's the least used, but could include +jon, +accounts and so on.

Prepending the lists with different symbols allows the different context types to be clearly grouped and differentiated, which is especially handy if Astrid ever starts supporting list sorting.

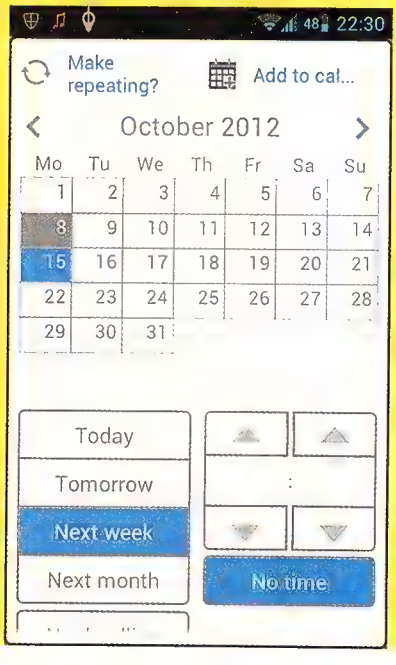
Now, every time you have a task to do, you need to put it into Astrid immediately; you also need to assign it as many applicable contexts as possible, with priority being the most important. By doing so, you can view specific lists related to your current context (@Work or .CurrentProject) or create filters (menu > New Filter) that combine common views.

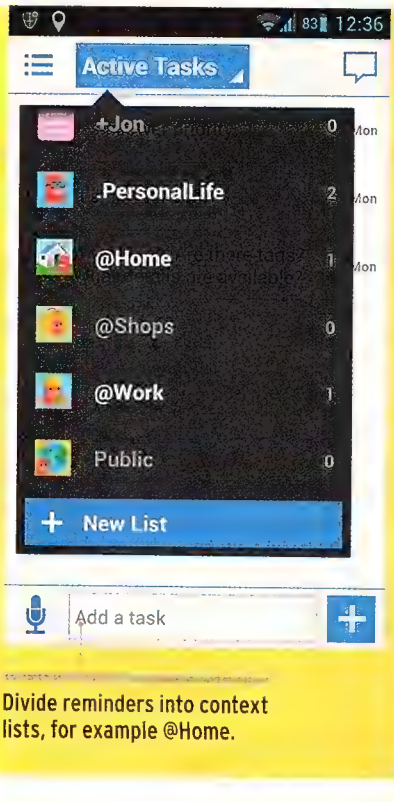
On the phone, hit Menu > Sort & Subtasks > By priority, and on the web, 'Sort by: Priority' (on the right of the list), and all you have to do is starting clearing the lists of tasks. Every time you clear the !!! list, assign new tasks from the lower priorities to the highest. Constant reassignment of your priorities is crucial.

If you like the idea of this methodology, you should visit **www.thesecretweapon.org**. It outlines a powerful Evernote + email based version that's well worth checking out. Although, I find that Astrid works a little better on mobiles, thanks to the nagging reminders, better task interface and collaborative options (it's great for creating shared shopping lists with your partner).



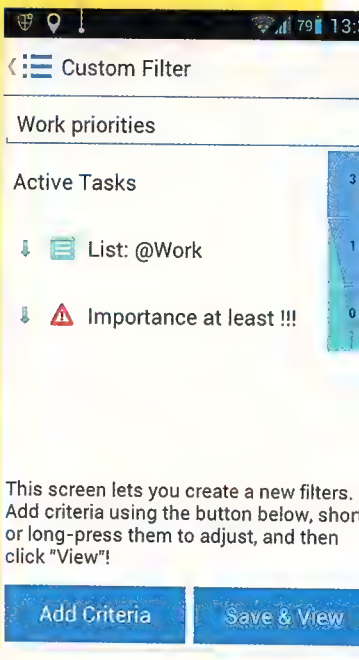
Add a task by typing it in the 'Add a task' bar – or by voice.





Divide reminders into context lists, for example @Home.

Create filters with different criteria to sort tasks easily.



This screen lets you create a new filters. Add criteria using the button below, shor or long-press them to adjust, and then click "View"!

Use your tablet as a MIDI control surface

Simon Chester knows how to make your musical life easier.

YOU'LL NEED THIS

TOUCHDAW

Download it from the Play Store and try out the free version to see if you like it before you pay for the full version..

MIDI control surfaces have long been a blessing for many musical performers, allowing access to the most common functions via intuitive controls, rather than a keyboard and mouse. However, the hardware is traditionally expensive, scaring off many beginners. Thankfully, with those wonderful, magical devices known as tablets, capabilities that previously required expensive, dedicated hardware are now only a few dollars and a MIDI control surface app away.

As an amateur (or established) musician, I'm assuming that you already have some sort of DAW (digital audio workstation), such as Ableton Live, Propellerhead Reason, Steinberg Cubase or Avid Pro Tools, in which you create or perform music. No? Come back when you do.

Yes? Well, you now need to find a midi controller that supports your DAW of choice. My choice and one of the most popular is TouchDAW by humatic. It's a bargain at $4.93 on the Play Store, and you can try out a free version to check that it works and see if you like it. It supports most of the popular DAWs, including Cubase/Nuendo, Live, Apple Logic, Pro Tools, Cakewalk SONAR, FL Studio, REAPER, Reason, Studio One, Samplitude, SAWStudio Digital Performer (7.2+) and Sony Vegas/ACID workstations. Standard functionality, like mixer and transport operation, is accessible in other applications as well.

Besides being a DAW controller, the app also provides a number of general-purpose MIDI controllers for controlling all your favourite sounds. Controllers include a multitouch keyboard, multitouch launchpads, a MIDI mixer, configurable X/Y controller pads (similar to the Korg Kaoss Pad) and the ability to link a phone's sensors to MIDI controllers, meaning that you can move the tablet around to make the music go all bendy and wobbly.

HOOKING IT UP

Connecting your tablet to your DAW obviously depends on the type of setup you have. The default way to hook up your tablet to your PC is through RTP (real-time transport protocol) over Wi-Fi. A comprehensive guide for RTP over Wi-Fi, including a video, is available at **tinyurl.com/9aza7o7**.

But if RTP Wi-Fi isn't your thing, you can also connect over Bluetooth, Wi-Fi multicast or USB (if your tablet supports USB host mode). Directions for hooking up using these other methods, as well as the required software to do so, can be found at **tinyurl.com/8gulexs**.

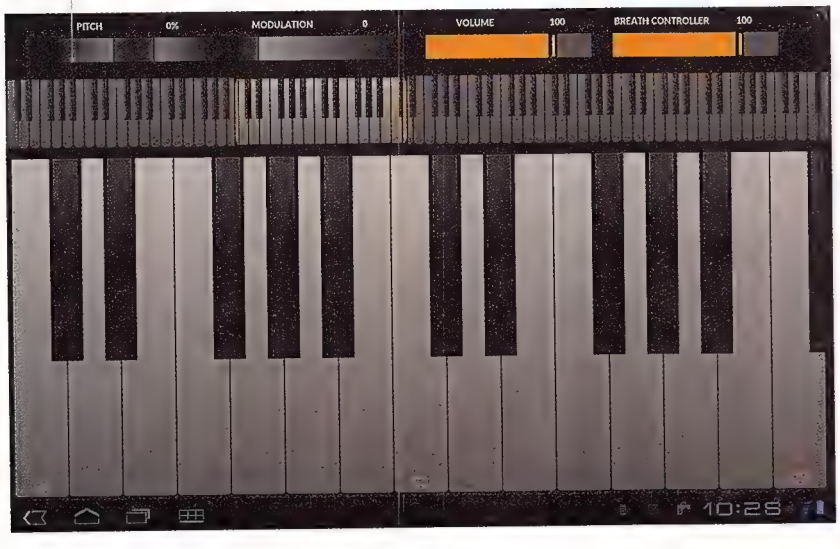
PERFORMING

When performing you should really disable all non-essential apps, not only because of the potential CPU cost, but because of the Wi-Fi traffic cost. I recommend turning off Auto Sync ('System Settings > Accounts and Sync' and flick the switch to 'Off'), as well as either logging out of Facebook or going to (within Facebook) 'Settings > Refresh Interval' and setting it to 'Never'. It probably doesn't hurt to disable notifications, too. If you have Facebook Messenger installed, you should do the same to it.

Finally, MIDI communication over RTP requires a constant, uninterrupted Wi-Fi connection, so make sure you set your Wi-Fi to remain on while your tablet screen turns off. Go to 'System Settings > Wi-Fi > (press the 'Menu' button) > Advanced > Keep Wi-Fi on during sleep' and select 'Always'.

TouchDAW is a powerful and complicated tool. I've given you some very basic information here, although I really recommend that you go check out **tinyurl.com/8gkm8hq** for the full rundown.

The keyboard has modulation and pitch control, plus two assignable controllers.



TouchDAW on tablet is a sophisticated tool.

Improve your Wi-Fi signal

Alex Cox explains the simple way to increase your Wi-Fi signal strength.

YOU'LL NEED THIS

A WIRELESS NETWORK

Sorry Ethernet users, but these tips will only speed up a Wi-Fi network.

INSSIDER

This Wi-Fi network analyser is available for free at **tinyurl.com/4jkptqp**.

There are loads of ways to get a faster wireless network connection. You can knock down walls in your house so the signal can travel more efficiently. You can chuck your current network hardware and buy a whole new set. Or you could go down the easier, free route of making sure your network is operating on the right channel and tweaking its settings for maximum speed. It's like tuning a radio to a different station.

There's a simple reason you might need to change your network channel: when there are many other wireless networks in your local area, signals can clash, causing interference that makes network traffic slow down. There are several possible channels a wireless network can operate on. We're going to look at the traffic in your area and move your network to the least-clogged channel, ensuring you'll get the best results.

1 GET STARTED

To analyse your local network traffic in greater depth, we're going to use a tool called inSSIDer. It's a full, open-source network analyser capable of some incredibly complex things, but we're really only going to skim the surface of its abilities. Download the installer from **tinyurl.com/4jkptqp** and run it – just click 'Next' repeatedly to get it installed.

Run insider – you'll find it inside a folder called 'Metageek' in your 'Start' menu. Click the tab marked '2.4GHz channels' and then look at the top of the screen for a button labelled 'Start'. This will start inSSIDer hunting around your local area for networks. It'll likely find many more than Windows would normally bring up. Make sure you click 'Stop' when you're done.

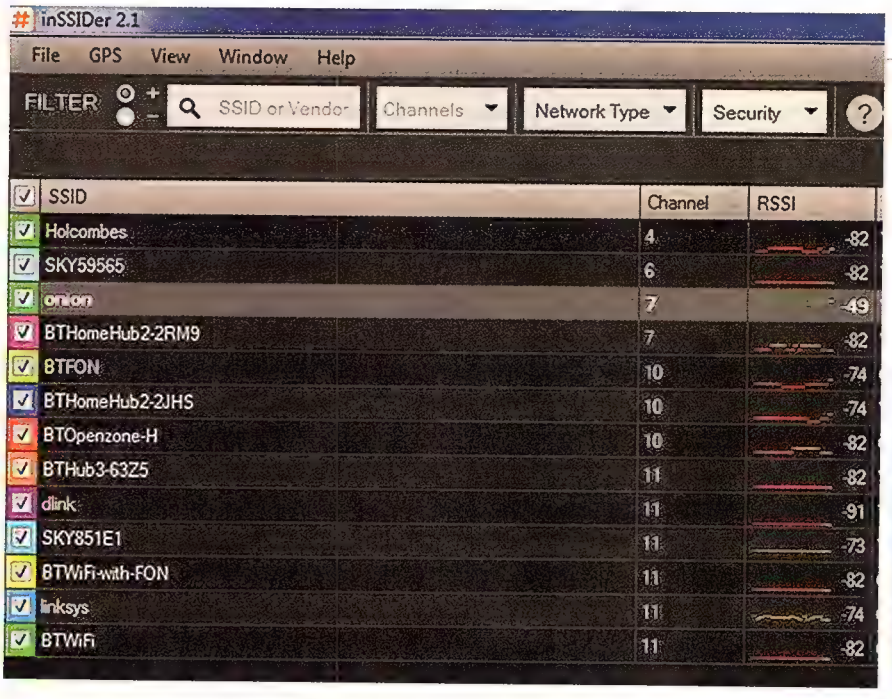
2 CHANGE THE CHANNEL

Look at the graph the program presents you with. This is a map of where the networks in your area fall along the 11 main wireless channels, their height representing their signal strength from your current location. It's up to you to interpret your own graph, since it won't be the same as ours. Find an area with some empty space, or find a quiet channel, and write down its number.

The channel you've picked will be your network's new home. If it's nice and clear, you should get a decent boost in speed out of it. But to change the channel on your wireless router, you're going to need to log in to its admin interface, which is different for every router. We'll show you the steps we took on our ASUS- WL-700ge – you may need to search the internet for specifics about your own model.

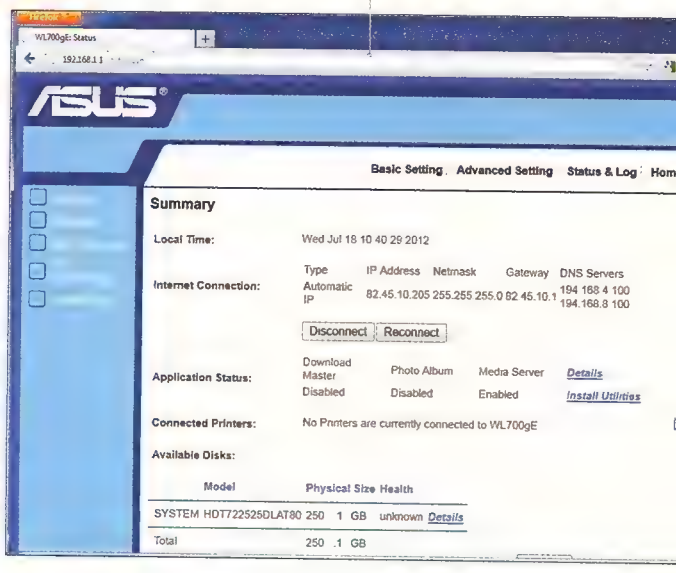
Start by firing up a web browser – any will do – and going to the local IP address of the wireless router; in this case, 192.168.1.1. This brings up the login screen of the router, where you'll need to enter your login credentials. If you don't know yours, it's likely they're still at their defaults, so dig out the manual or search on the internet and you should be able to gain access.

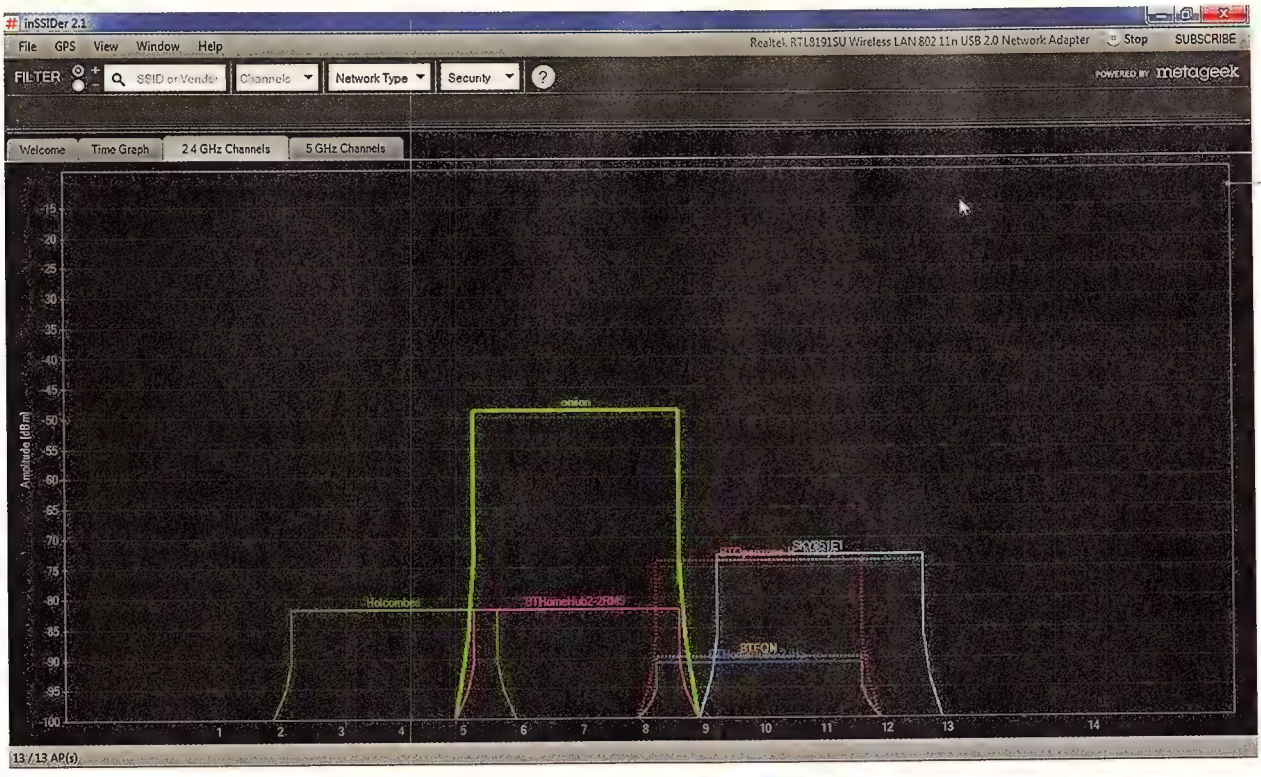
From here you need to access the 'Advanced Settings' screen, as the basic wireless settings don't offer the option to change the channel. It's rather simple on this router to change the channel: there's a drop-down box in the middle of the screen that lets us do it. Again, your router will have a different settings menu, but the process should be quite similar. While we're poking around, we can also look for a number of other settings that will keep the router speedy.



inSSIDer hunts for networks in your local area.

Access the admin interface of your wireless router.


ASUS
Basic Setting Advanced Setting Status & Log
Summary
Local Time: Wed Jul 18 10 40 29 2012
Internet Connection:
Type IP Address Netmask Gateway DNS Servers
Automatic IP 82.45.10.205 255.255.255.0 82.45.10.1 194.168.4.100 194.168.8.100
Disconnect Reconnect
Application Status:
Download Master Photo Album Medra Server Details
Disabled Disabled Enabled Install Utilities
Connected Printers: No Printers are currently connected to WL700gE
Available Disks:
Model Physical Size Health
SYSTEM HDT722525DLAT80 250 .1 GB unknown Details
Total 250 .1 GB



This graph maps your local networks, with height representing signal strength.

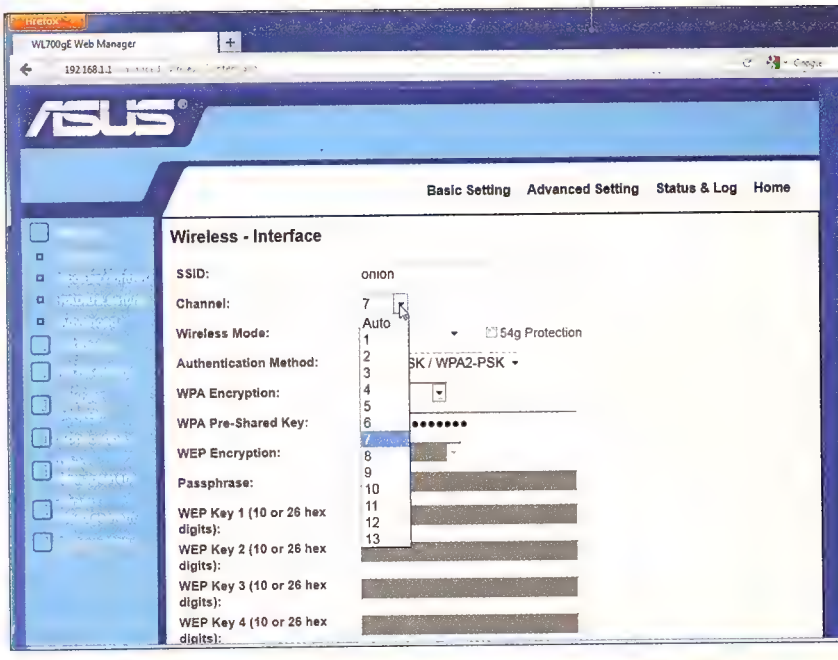
MAKE FURTHER CHANGES

You're also given the option of setting a wireless mode, in this case choosing to turn off the older 802.11b service. If you still have devices that use it, you'll want to leave it switched on, but if you only have modern 802.11g devices in your house, you can safely switch off this mode and claw back the tiniest fraction of a speed boost. Then it's time to head to the advanced wireless settings page.

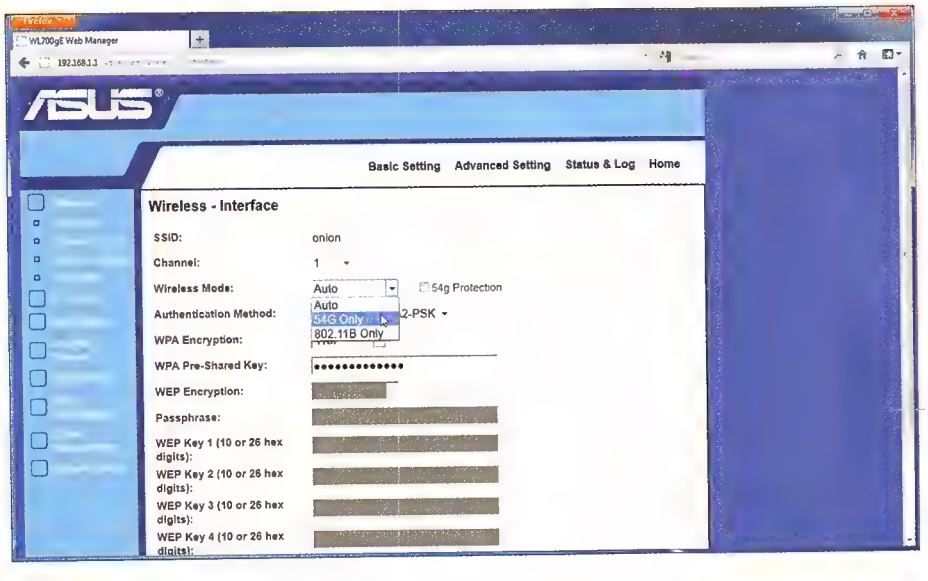
Here, we'll stick to the bits we know are going to help wireless speed. Turning up the radio power should provide a better signal at a distance, so we'll do that. Turning on the 'afterburner' mode is only useful if you have wireless cards or dongles in your computers that support it, so we'll leave it off. And frame burst, lower down the page, is a must.

You'll then need to apply them and save your settings. Your router will probably reboot. Once everything has come back online, run inSSIDer again to check the results of your changes and ensure that your wireless connection has moved from its original channel to its new home. Try a download – you should see the benefits immediately.

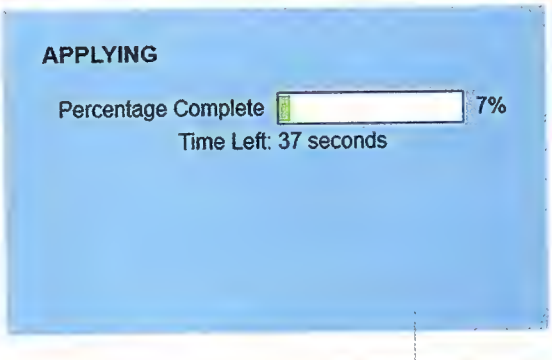
So what you've done is checked out the wireless channels in your area, found the ideal one for your network and hopefully, depending on your router, switched its channel to some empty space. If it seems to have made things worse, there may be some other interference – a cordless phone, for example – in your new channel, so try a few until you find the best one.



For this router, a drop-down box lets us change the channel.



Turning off older wireless modes may give you a small speed boost.



Your router may reboot after you apply and save your settings.

Back up your cloud storage with GoodSync

Alex Castle shows you how to tame all your files in various locations and back them up with GoodSync.

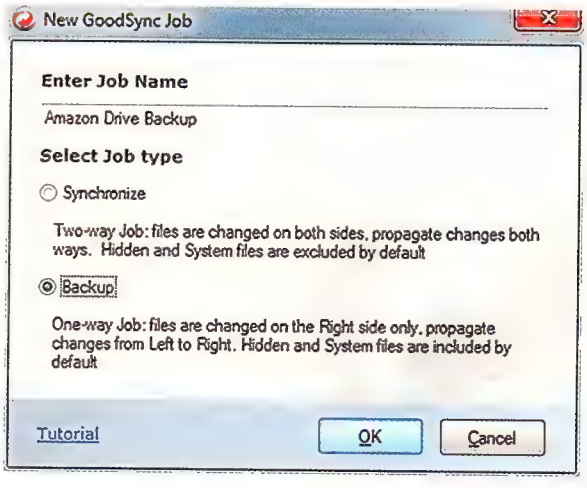
YOU'LL NEED THIS

GOODSYNC

This cloud storage backup software is available in free and paid versions at **www.goodsync.com**.

With so many cloud storage services available to you, you don't ever truly need to pay for online storage. When your 2GB Dropbox runs out, you can always get 5GB free from Amazon. When that runs out, why not open up a SkyDrive account for an additional 7GB? The only problem with this plan is that your files get spread out over different services, which can make it harder to find things, and can also increase your exposure to risk of losing access to files during service outages. In this article, we'll show you how to mitigate both of these problems by using GoodSync to keep an up-to-date local backup of all the files on multiple cloud storage services.

1 INSTALL GOODSYNC


New GoodSync Job
Enter Job Name
Amazon Drive Backup
Select Job type
Synchronize
Two-way Job: files are changed on both sides, propagate changes both ways. Hidden and System files are excluded by default
Backup
One-way Job: files are changed on the Right side only, propagate changes from Left to Right. Hidden and System files are included by default
Tutorial
OK
Cancel

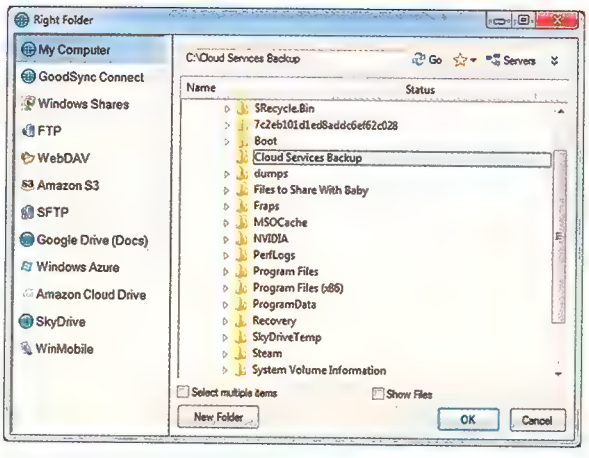
You can find the GoodSync software available for free at **www.goodsync.com**. The free version does have some limitations – notably on the quantity of files that can be backed up – but it can be used indefinitely and is at least a good way to judge whether the full version is worth US$30-40 to you.

Download the file and run the installer. There's nothing much to configure during the installation; just see it through to the end and you'll be asked to name your first job. GoodSync organises all of your syncing tasks into jobs, each consisting of two locations to sync, which can be on your hard drive, USB drive, network storage or even in the cloud.

2 PICK YOUR BACKUP LOCATIONS

One of the major advantages of GoodSync over a simpler sync application like SyncToy is the ability to connect directly to several of the most popular cloud storage services. If you use cloud storage from Google, Amazon or Microsoft, you can set up a job that backs them up directly. To do so, just click the 'Browse' button next to the left location field and in the menu that pops up, select the service you want to connect to. Enter your login credentials and click 'Go' to connect to the service and see a list of folders to sync.

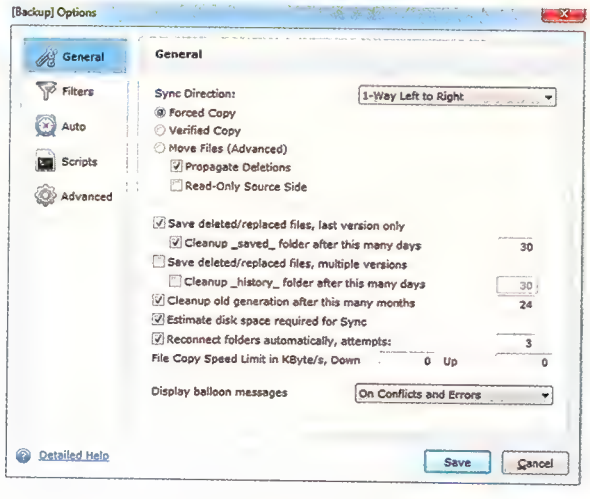
GoodSync can't connect directly to Dropbox, but it's still an easy to back up those files using the software, as long as you have the Dropbox client installed on your PC. Simply click the



'Browse' button and select 'My Computer' to browse to the location of your 'My Dropbox' folder.

Next, click the 'Browse' button next to the right-hand 'Location' field. This time, in the pop-up window select the location where you want your backup files to be stored. You can click 'My Computer' and choose a local location or select Windows Shares or FTP to select a network location.

3 SCHEDULE YOUR BACKUP



Once you've specified both the left- and right-hand locations, you just have to tell GoodSync how to transfer files between them. To do this, click the small icon in the upper-centre of the GoodSync window with a picture of two green arrows. In the window that opens, click the 'Sync Direction' to back up from the cloud account to your local location, not vice versa.

Finally, click the 'Auto' tab in the 'Backup options' window to select how often GoodSync will automatically back up. Unless you need to know that your files are instantly backed up, we recommend that you conserve system resources by scheduling a backup every two hours or more.

TECH life AUSTRALIA

SHOP AT THE WORLD'S BEST TECH SALES
INSANE BARGAINS VIA YOUR BROWSER
TECH life AUSTRALIA
ISSUE 06 DECEMBER 2012
Revealed!
AUSTRALIA'S BEST PHONE
OUR INDEPENDENT LABORATORY TESTING SHOWS A CLEAR WINNER
HINT: IT WINS ON BATTERY LIFE, SCREEN QUALITY, PERFORMANCE, APPS, CONTENT AND SECURITY
XMAS GIFTS BY PERSONALITY
TECH PRESSIES FOR DIFFERENT PEOPLE
ULTRA-FAST USB 3.0 DRIVES
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Choose the best Android web browser

Are you getting the full web experience on your mobile phone? Nick Odantzis — from our UK partner magazine — explores.

YOU'LL NEED THIS

AN ANDROID PHONE

Your phone will need to be running Android 2.2 (Froyo) or higher.

WI-FI CONNECTION

Downloading and experimenting with new mobile browsers is a good way to demolish your monthly data allowance, so connect to a Wi-Fi network before you begin.

More than half of Australia's population owns a smartphone of some kind, so it's no wonder that around a third of our web browsing is done via a phone and that portion is only likely to increase. It's therefore strange that while the browser war is a closely fought competition on laptop and desktop PCs, with the likes of IE9, Chrome and Safari battling it out, the mobile landscape is less frenetic.

The majority of smartphone owners – well, in the case of Android anyway – actually prefer to use the standard browser provided out of the box.

Some might argue the reason for this is because the Android browser is the best one out there, so there's no need to change. There's a reasonable probability many owners don't change their browser because they feel they don't need to – mobile browsing is marginalised anyway.

Alternatively, perhaps they don't feel the need to upgrade in the same way as their laptop and desktop applications. It's also possible that there are so many other apps to update, the browser is at the bottom of the list.

WHY CHANGE?

That's a shame, because Google Play offers some great browsers that are – in our opinion – better alternatives to the standard one. After all, not all browsers are created

Some mobile browsers will use less data than others.

LEARN ABOUT WEB SITE COMPRESSION

Opera Mini (currently at version 7) is the Usain Bolt of the browser Olympics – speed is its number one priority, enabling you to download web pages faster than you can with a standard browser.

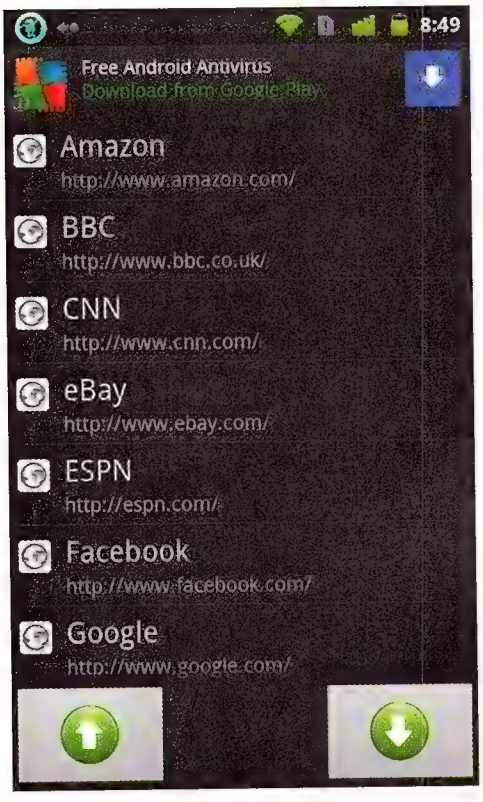
Fast web browsing is always an advantage, but it's even more beneficial when you're relying on a flaky 3G internet connection on the move. Opera Mini is able to deliver web sites to your smartphone quicker because of the way it handles pages before they get to your screen.

A proxy server sits between you and the web site and compresses pages into a format that's more suitable for smaller screens. You can customise the way it compresses pages by adjusting the image quality of web sites, allowing them to load even faster.

Better yet, the compression means that the amount of data you use each month will also decrease significantly. This is great if you're on a mobile contract with a restricted data allowance. The downside of this is that some web sites won't work as well as others. For example, you don't get any HTML5 or Flash support, so if you want to play videos and games on your smartphone then you should probably look elsewhere.

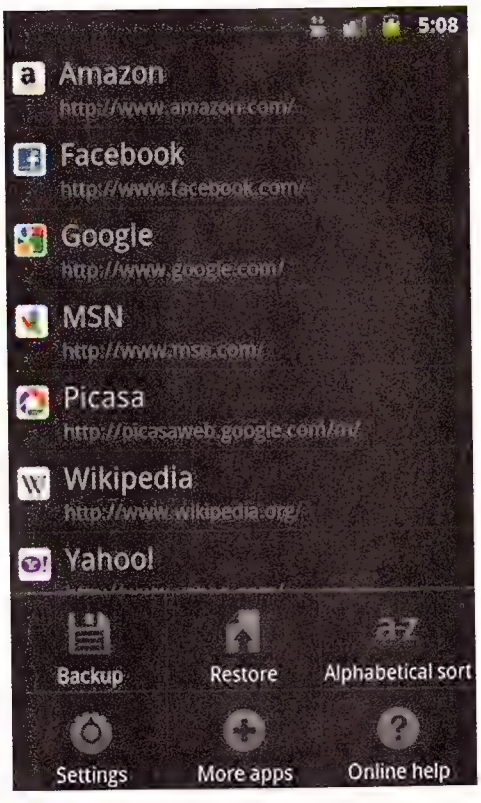
KEEP YOUR FAVOURITES

Back up shortcuts when you move browsers.



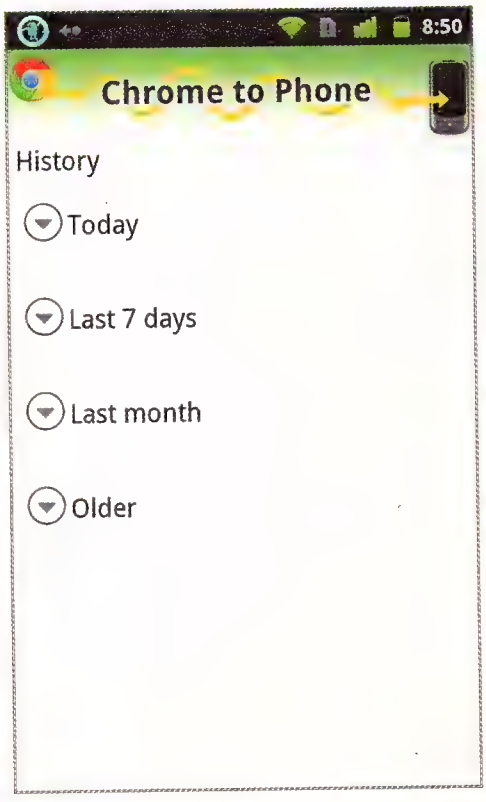
01 Find bookmarks

Download Bookmark Sort & Backup from the Google Play Store and open it to display a complete list of all your browser bookmarks. Scroll down to make sure that everything's there and then hit the 'Menu' button. There are various options here – you can sort your bookmarks alphabetically, for example.



02 Back them up

If you want to add some more bookmarks to your list at the last minute before you back them up, tap the 'Create' button and type in the name and URL. Once you're ready to back everything up, tap the 'Backup' button to save your bookmarks. When you want to load the bookmarks again, hit the 'Restore' button.



03 PC to phone

If most of your regular bookmarks are on your PC, you can quickly transfer them to your phone if you're using Chrome. Grab the Chrome to Phone app on your mobile and install the extension for your browser (**tinyurl.com/42zq5j5**). Click 'Chrome to Phone' in your Chrome toolbar when you're viewing a site on your PC to send the link to your phone.

equal and there are various reasons why you might want to upgrade the standard software.

For starters, some browsers are just plain faster than others and not by mere milliseconds. In some cases there's a difference of up to 15 seconds when loading pages, which should be enough to convince anyone to rethink their choice of application.

FASTER LOADING

If speed is your thing, then you can opt to use a browser that's been stripped of much of its advanced functionality in favour of better performance, such as Opera Mini or Dolphin Mini. You won't get the full experience of conventional browsers, though, and sometimes you might lose compatibility with particular web pages that require the browser to load certain functions, so you need to choose which features are most important to you.

HARD NUMBERS

If hard numbers don't do it for you, then you might be interested in a browser that's easier to use, or offers tools that better suit the way you browse. Dolphin HD, for instance, comes with many extra features, including the ability to issue gestures that can quickly transport you to your favourite web sites without the need to find them from your Favorites. The standard Android browser doesn't allow you to do this.

Another consideration when choosing a browser for your smartphone is security. Although this tends to take a bit of a back seat for most people when it comes to mobile internet browsing, smartphones are no safer from vulnerabilities than their desktop counterparts.

In fact, security is perhaps even more of an issue on Android phones. That's because, despite Google's vetting procedures, you still might download a third-party app that could compromise your personal details. Some of the tests we'll run in this article will show you just how to test your mobile browser to make sure it's keeping you safe while you surf the web.

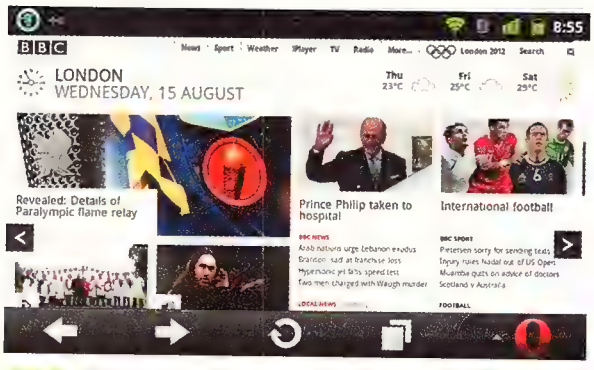
PLAY AROUND

There are approximately 10 aftermarket browsers available on the Google Play Store, all of which are free to download. We've tried them all out and discovered which ones are best suited to particular tasks, such as opening a web page quickly or providing compatibility with the greatest number of web sites.

We're also going to show you how to perform a range of tests on a browser yourself, so if you'd rather explore everything that's out there at your own pace, you can pinpoint the perfect software for your needs.

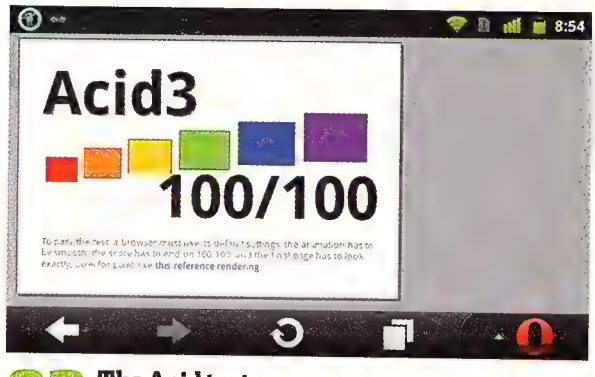
GIVE YOUR BROWSER A GRILLING

Not sure how your web browser compares to others? Here's how to check.



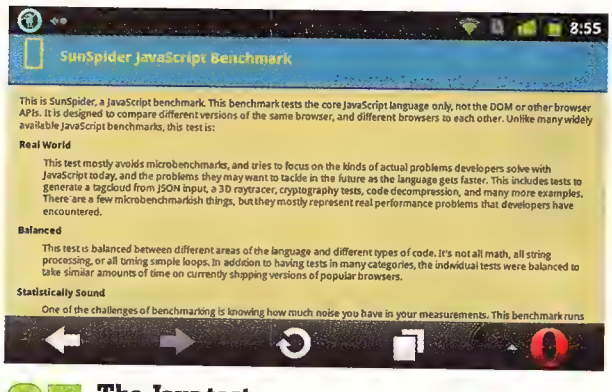
01 The speed test

For many people this is the most important feature of a browser. Testing speed is easy. Just pick a variety of pages; some with lots of images, some with just text and some with a mixture. Make sure the browser cache is cleared and then time how long it takes for pages to load. Try it a second time to see how the browser fares when the site is cached.



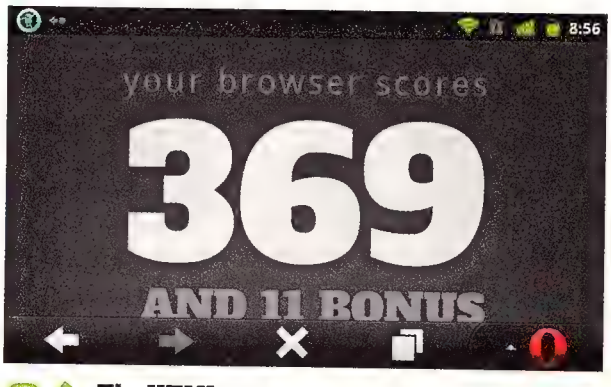
02 The Acid test

To find out if a browser is up to scratch, use the Web Standards Project Acid Tests: Acid1, Acid2 and Acid3, the latter being the most up to date. The tests are designed to expose web page rendering flaws. Go to **www.acidtests.org** and run through the Acid3 test. If you don't get a perfect score in Acid3, then it's a fail, though some failures are worse than others.


SunSpider JavaScript Benchmark
This is SunSpider, a JavaScript benchmark. This benchmark tests the core JavaScript language only, not the DOM or other browser APIs. It is designed to compare different versions of the same browser, and different browsers to each other. Unlike many widely available JavaScript benchmarks, this test is:
Real World
Balanced
Statistically Sound

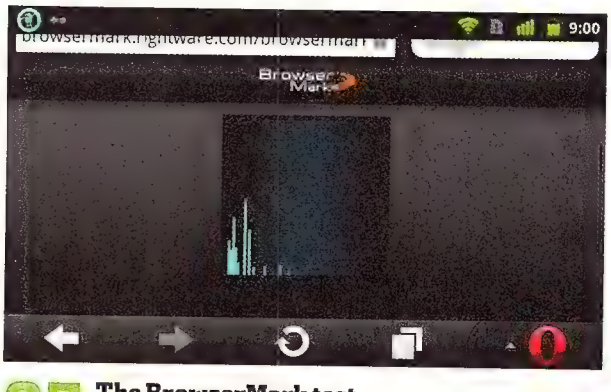
03 The Java test

SunSpider tests the speed of a web browser and uses JavaScript as its measure of performance. It's designed to be a real-world test, and has very little margin for error due to the way it works. Visit **tinyurl.com/4h87sa2** and tap 'Start SunSpider now'. The app will run a series of tests and give you a score at the end. The lower the overall number, the better the browser performs.



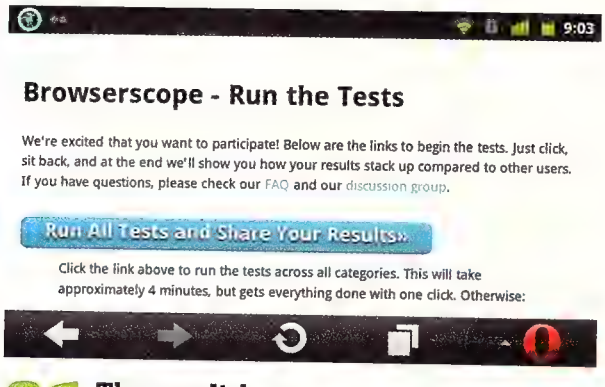
04 The HTML test

An alternative is finding out how your browser copes with HTML5. Visit **www.html5test.com** for a rating. However, the score's generic, intended to highlight the browser's capability across multiple platforms. Peacekeeper HTML5 (**tinyurl.com/442cfax**) gives your browser a thorough shakedown and is more accurate. The higher the score, the better.



05 The BrowserMark test

Although BrowserMark (**browsermark.rightware.com**) is similar to Peacekeeper, it's worth using both for the purpose of consistency. The scoring system is different for BrowserMark, so while one browser might score well in Peacekeeper, BrowserMark might bring up a different result. This could help you choose between two browsers you like.


Browserscope - Run the Tests
We're excited that you want to participate! Below are the links to begin the tests. Just click, sit back, and at the end we'll show you how your results stack up compared to other users. If you have questions, please check our FAQ and our discussion group.
Run All Tests and Share Your Results»
Click the link above to run the tests across all categories. This will take approximately 4 minutes, but gets everything done with one click. Otherwise:

06 The one-click test

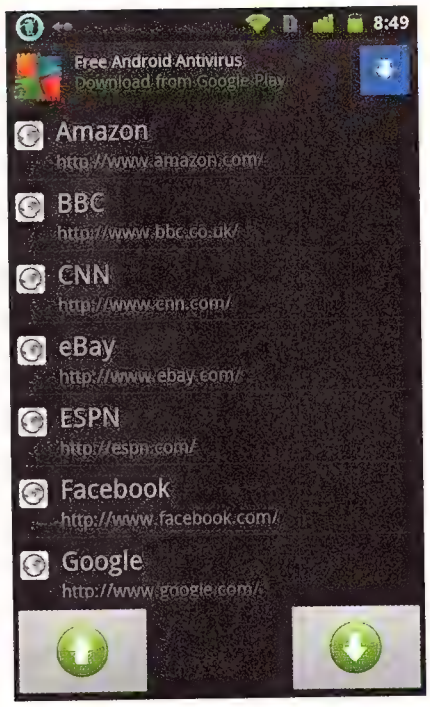
For an easier way to test your browser, try the one-click approach of Browserscope, which munches through the standard browser tests and checks for security. Go to **www.browserscope.org** to run the tests back to back or individually. Once complete, Browserscope gives you a final score and shows you how it compares with other browsers.

THE BEST MOBILE BROWSERS

Here are four of the top Android browsers — choose the one that suits your needs.

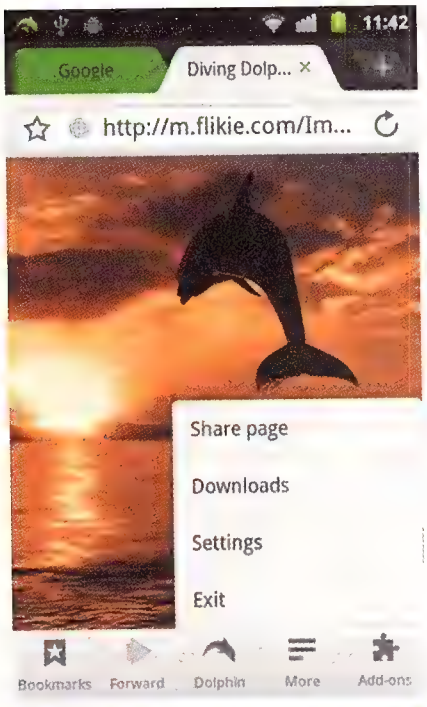
01 Speed: Opera Mini

For most people, the main consideration is speed – the faster a browser can load web pages, the better. In this respect, Opera Mini has every other browser licked. Its compression feature dramatically reduces the time taken to load pages. In some cases Opera Mini is about five times quicker than some of its rivals, so it's worth trying out if your primary aim is to browse the web at lightning-fast speeds.



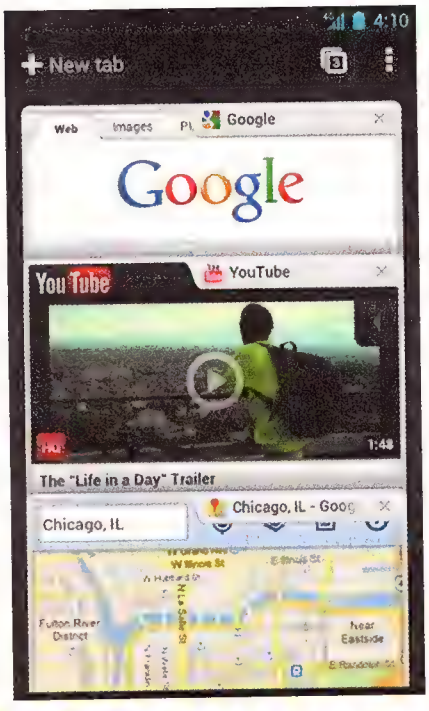
02 Compatibility: Opera Mobile

This browser supports Flash, has an exceptionally high HTML5 score and passes the Acid3 test easily. If you want web pages to render as accurately as possible on a small screen, Opera Mobile is the perfect choice. Unlike its smaller brother, however, it isn't the quickest browser out there. In fact, it's pretty average, but that's the price you pay for displaying web pages as they're meant to be.



03 Features: Dolphin

Dolphin HD goes beyond the call of duty when it comes to mobile internet browsing. Not only do you get voice search so you can speak the web sites that you want to visit, you can have multiple tabs open for each of your sites. Dolphin even allows you to create a unique gesture to open your favourite sites, so you could draw a face for Facebook, or flick the screen to go to Flickr.



04 All-round: Chrome

The baby version of Google's unbeatable desktop browser has a lot to offer. It provides a decent turn of speed, has good compatibility with most web sites and has a very intuitive interface, with tabbed browsing for easy switching between sites and a clever search bar that brings up suggestions automatically. The only caveat of the Chrome browser is that you need a phone running the latest version of Android – 4.0, or Ice Cream Sandwich, to be precise. apc

BROWSER SPEED TEST RESULTS

	HTML5	Acid3	SunSpider	BrowserMark	Speed *
Opera Mini	63	48/100	FAIL	FAIL	5 seconds
Opera Mobile	369	100/100	2,179	43,163	10 seconds
Dolphin	189	95/100	2,372	80,027	7 seconds
Chrome	371	100/100	1,851	86,187	11 seconds

* Speed test demonstrates the time taken to open the www.bbc.co.uk web site.

Organise your Android phone

Nick Odantzis shows you how to tame and organise your Android phone.

YOU'LL NEED THIS

AN ANDROID PHONE

Your phone should be running Android 2.0 or higher. You'll also need some space to install new apps, either on the phone itself or on a microSD card.

Smartphones represent the pinnacle of mobile technology, but they're not without their flaws. For example, we still communicate by texting when really we should be doing it another way. Although most people are happy to accept convention, that doesn't mean that we're doing things as well as we could do them.

Enlightened types, however, understand that the great thing about smartphones – Android models in particular – is that they can be upgraded to address certain bad habits. A phone's usability can be dramatically improved with a few minor changes to the way we do things.

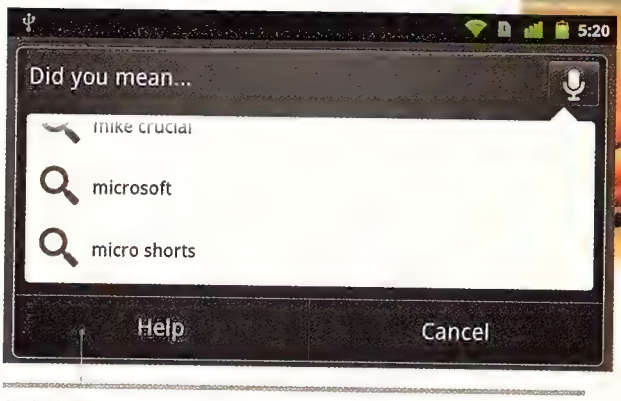
One great way of cutting down on the amount of typing you have to endure each day is to download the nifty Android application Swype (**www.swype.com**). Once installed, it integrates with your keyboard settings and replaces the standard Android keyboard with Swype's own, allowing you to (as the name implies) use swipes of the keyboard to form words, instead of having to press individual keys. It's much faster and surprisingly accurate. Swype is still in beta so it's not yet available on Google Play.

SECURITY PATTERN

Unfortunately, Swype doesn't play nicely with the Android lock screen, so if you want to use its swiping text predication to unlock your screen each time, you'll have to look elsewhere. Thankfully, you won't have to go too far because you can set a Swype-esque security password using Android's own settings, which allow you to use a pattern instead of a PIN.

In the 'Settings' menu, go to 'Location & security' and tap 'Change screen lock'. If you already have a password for your phone, enter this and then choose 'Pattern' from the menu. Tap 'Next' and 'Next' once more, then draw your chosen pattern and repeat it to confirm it. Now, each time you wake your phone from sleep you can simply draw the lock pattern you chose instead of typing words and numbers.

If the thought of using your fingers to type more than a couple of words makes you want to hide, there are ways to cut down on your tapping time. By using Voice Search, which is built into your Android phone, you can do away with your current method of text input and use speech instead. It's easy to use and can be used in a variety of situations. For example, when you're searching for something online, just tap the voice button and say what you want to find. When you're composing a text message, you can say the recipient's name. You can even dictate directions to the Navigation app, allowing you to get from A to B quicker.



Android's handy built-in voice search can save you valuable time.

CONTROL YOUR TALK TIME

Beyond simple ways of speeding up common tasks on your phone, there are many things you can do to make life with your mobile easier.

If you find yourself regularly picking up your phone to handle incoming calls, an app called Super Missed Call can seriously cut down on the amount of time you spend dealing with a ringing mobile, thanks to the way it allows you to control your talk time. When you want to ignore a caller, you can simply rest your phone on its screen. When you pick it up again, Super Missed Call will automatically phone that person back for you, meaning there's the bare minimum of intervention on your part. You can even schedule missed calls so that you'll get a reminder to call people back, which is useful if you tend to be forgetful or you just lead a very busy life.

Another way of dealing with all notifications – not just phone calls – is to channel them away from your actual phone to another device so that you can deal with them more efficiently. When you use Android Notifier, which sends your messages, phone calls or emails from your phone to your desktop or laptop PC, there's no need to get your phone out while you're busy at work, which is you can deal with everything on one machine.

If you really must have your phone in front of you at all times, Smart Screen is a neat way of making it easier to check what's on the screen. This app lets you wave your hand over the screen to turn it on or off. No, it's not a Jedi trick – it works by using the phone's built-in proximity sensor. In case you were wondering, you can adjust the sensitivity of the app so you don't accidentally set it off in your pocket.

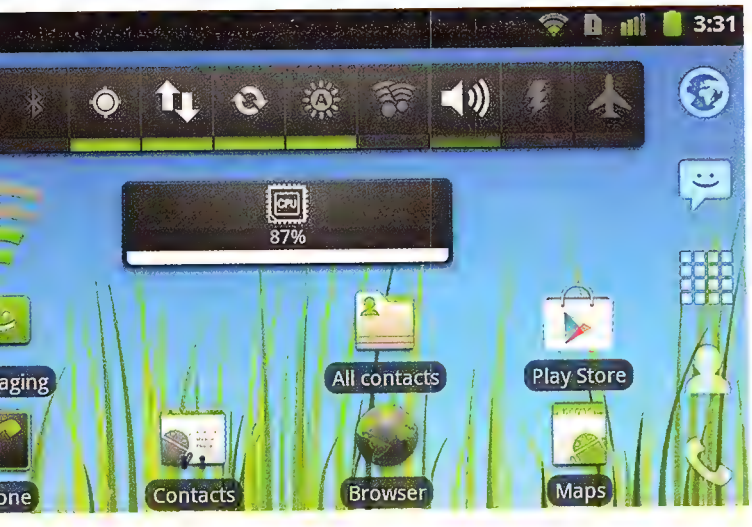
GET A HANDIER HOME SCREEN

The standard home screen on an Android phone isn't really designed with usability in mind. Apps and functions are hidden away in off-screen menus, so there's no way to get quick access to the things you need.

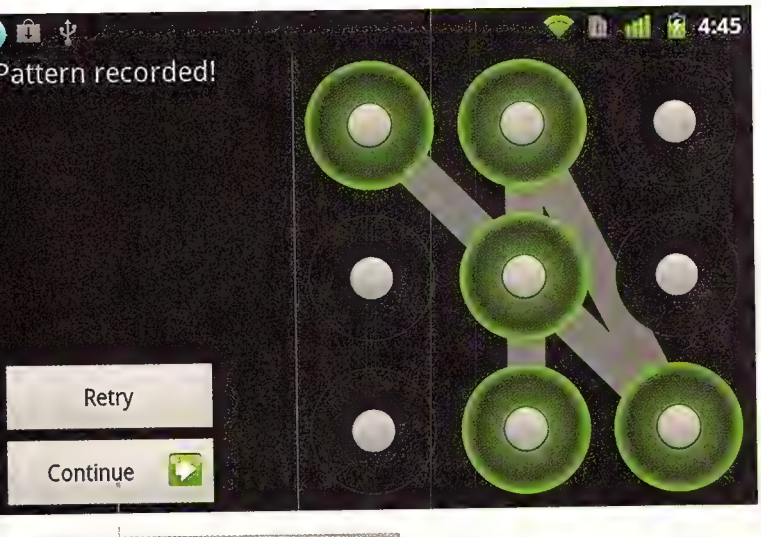
With a couple of modifications you can make your home screen work the way you want it to. For starters, you can move your favourite apps to the home page so you can access them without delving into the main menu.

If that's not enough, you can go a step further and install LauncherPro, which allows you to fully customise your home screen for maximum usability. This tool lets you do some really useful things like categorise your apps by type (much like on the iPhone). Moving applications into specific folders makes them much easier to find, especially if you have a lot of them installed.

Widgetsoid is another great tool that lets you add functionality to your home screen, giving you access to tools like Aeroplane mode at the top of the screen.



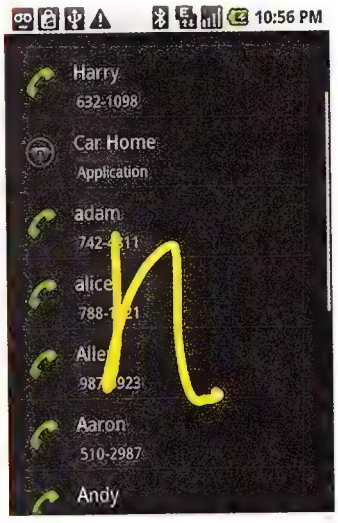
LauncherPro lets you add extra functionality to your home screen.



Android lets you unlock your phone with a gesture rather than a password.

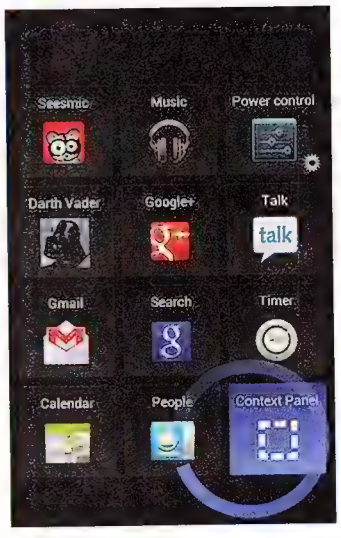
FINDERS KEEPERS

Find anything on your phone in seconds.



GESTURE SEARCH

01 If you're looking for a more visual way of searching, Gesture Search is the perfect app. Instead of looking through various menus to find the file or app you want, you simply draw the name of what you're looking for. It's obviously easier to find what you want if you know the full name, but if you don't, the app will learn what you search for regularly, so you'll get more accurate results over time.



SWIPEPAD

02 This tool gives you easy access to all the rest of the apps on your phone no matter where you are, whether you're browsing the web, playing a game or adjusting your settings. Just swipe from a preset corner of your screen towards the centre and your apps will magically appear on top of whatever you're doing. To select one, simply release your finger while you hover over its icon.

X-PLORE

03 When you need to manage all the files stored on your phone, X-plore is a great way to speed things up. It shows you all the files and folders as if you were looking at them in Windows Explorer on a PC, making it easy to move things around, rename files or delete folders. You can even open up files and choose which program to access them with.

Master Windows 8 admin tools

Keep your PC ship-shape with Windows 8's admin tools. Dave James shows you how.

YOU'LL NEED THIS

WINDOWS 8

You obviously need the operating system installed on your computer.

You have to admit, Microsoft has taken a sizeable gamble with Windows 8. Some commentators say that the company simply has to change the way it operates if it wants to gain any traction in the tablet and smartphone market, and with the new operating system's touch-oriented interface, it has certainly started down that path. With the Modern UI, Windows has undergone a radical rethink in terms of both operation and interactivity.

For us desktop users, it represents a massive change from what we've become accustomed to over the years. Gone is the desktop as we know it and, more jarringly, gone is the 'Start' menu that we've come to love since the somewhat dysfunctional days of Windows 95.

WINDOWS 7, BUT BETTER

There's no need to worry, as really all we're looking at with Windows 8 is essentially a reskinned version of Windows 7 with some fancy new GUI components dropped on top of it. As Microsoft itself says, it's Windows 7, only better.

OK, Microsoft's developers have done more than just update the graphics, so that glib assessment is rather oversimplifying things, but the basic point is that you won't be losing out on any of the functionality you enjoyed with Windows 7, which has evolved into one of Microsoft's finest operating systems to date. Some things may seem like they've been hidden, but as soon as you get used to the new layout, it will all become second nature.

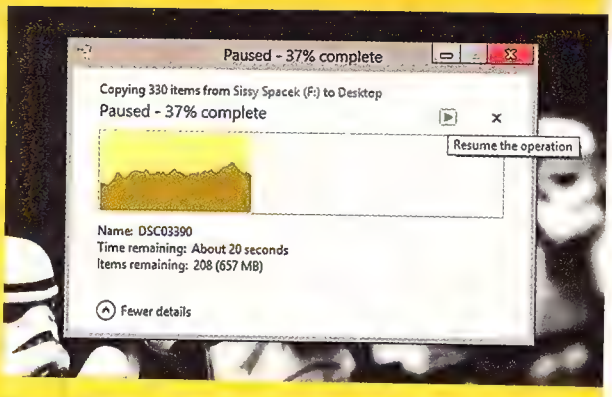
The first thing you need to be aware of is the powerful new user menu. It's a simple right-click away from any screen, whether you're using the desktop or the Modern UI and it contains quick links to all the most important administrative functions you could possibly need when setting up or keeping your PC running smoothly. From here you can dive straight into the likes of the 'Device Manager' or 'Disk Management' dashboard and start tweaking things immediately. Microsoft has obviously spent time deciding which of the most

FILE TRANSFERS

Moving data around your hard drive or between PCs is one of the most common computing tasks and while it's not particularly exciting, Microsoft has updated Windows 8 to make the process faster and easier.

The most obvious change is the new interface that pops up when you start moving files and folders. Initially it looks like the standard bar filling up, but if you click for more details, it reveals much more information. You'll see a dynamic chart detailing how fast the transfer is going and a history of its performance. You can pause and resume file transfers, too – something that's not possible in Windows 7.

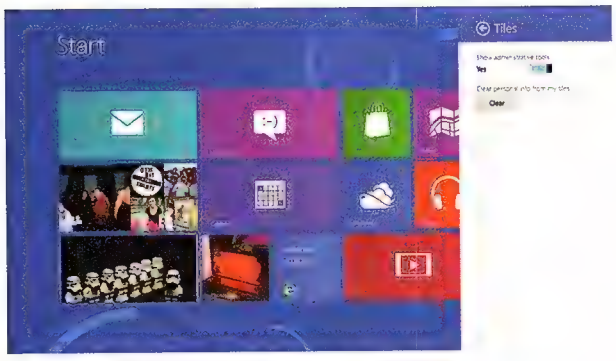
Transfers will also pause if the device goes into sleep mode, allowing the user to continue on restart. Hidden enhancements mean that file copy interrupts are now saved until everything else has been completed. If there's a possibility of copying over an existing file, for example, it will be held over until the end and won't hold up the queue waiting for the user to click 'Continue'.


Paused - 37% complete
Copying 330 items from Sissy Spacek (F:) to Desktop
Paused - 37% complete
Resume the operation
Name: DSC03390
Time remaining: About 20 seconds
Items remaining: 208 (657 MB)
Fewer details

You can now pause file transfers and resume them later.

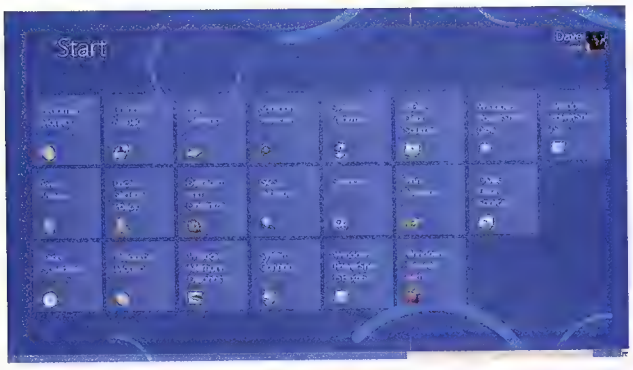
BRING OUT THE ADMINS

Unleash the admin tools on the 'Start' screen.



SHOW ADMIN TOOLS

01 On the Windows 8 'Start' screen, bring up the Charms bar from the right-hand side of the screen and click 'Settings'. Select the 'Tiles' menu and slide the bar that says 'Show administrative tools' to the right. Then just tap anywhere on the main screen to remove the Charms bar and the administrative tools will be displayed.



GET ORGANISED

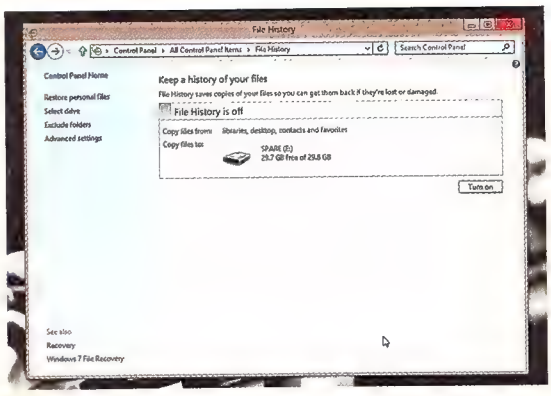
02 When these tools appear, they may be mixed in with other shortcuts, but we'll show you how to tidy them up. You can group icons together on the 'Start' screen with a few clicks. First, minimise the icons by hovering the mouse over the bottom-right corner and clicking the minus symbol. You can then see the individual groups by right-clicking on them.

ARRANGE GROUPS

03 When you right-click, a bar will appear at the base of the screen giving you the option to 'Name group'. Once you've entered a name, you can zoom back to the 'Start' screen and move individual icons between groups. Return to the minimised view and you can move entire groups by dragging and dropping them into your preferred location.

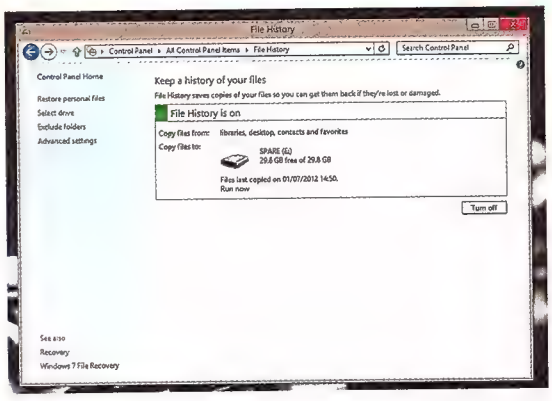
FILE HISTORY

Make quick and simple file backups.



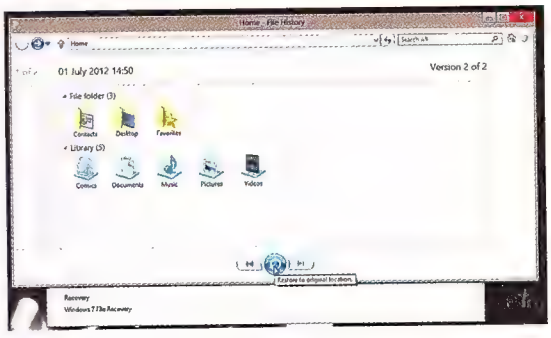
LOCATION, LOCATION, LOCATION

01 Windows 8 makes it easier than ever to quickly back up important files. The new File History app lets you select a device to use for automatic backups for your desktop and Libraries. First, enter the 'Control Panel' and start 'File History'. Alternatively, with a fresh USB drive, Windows 8 will let you get started with File History straight away.



START SYNCING

02 If you haven't plugged in a USB key or other storage device, now is the time to do so. The drive will appear in the window and 'File History' will be switched off. Click 'Turn on' to begin syncing content to the drive. You can exclude a folder by selecting it in the 'Exclude folders' option and add Libraries by creating new ones and filling them with folders.



MANAGE ARCHIVES

03 The advanced settings will detail how long to keep outdated versions and how often to back up the whole lot. If you delete a file from your main drive that you then need to back up, you can use 'Restore Personal Files' to select an appropriate restore point. You can even drill down through the backups to see which files are in each option.

important services it wants to put in this menu and if an administrative feature has been left out of the one-click system, it will probably only be a second click away – in the 'Control Panel', for example.

If you prefer, you can drop all the serious admin tools into the Modern UI straight away (see 'Bring out the admins' on page 105), so you can jump directly into whichever one floats your boat from the 'Start' screen. There are a few more tools in this group than there were in Windows 7, but for the most part these aren't new options – just ones that have been moved in from elsewhere.

The 'System Information' option is a particularly useful page, giving you detailed specs, locations and builds for the various kinds of software and hardware that make up your PC. Clicking on any of the categories will give you a full summary of how things are running. For example, the 'Disks' section of the 'Components/Storage' category shows exactly what make your hard disk is, what partitions are running on an individual storage drive and how full they are. If you want to know exactly what's making your PC tick, this is the place you'll need to go to in order to get a look at all the necessary information.

CLEAN & POLISH

Speaking of playing around with your machine's disks, Microsoft has also moved two of the most commonly used disk management utilities under the 'Administrative Tools' umbrella: namely 'Disk Cleanup' and 'Defragment and Optimize Drives'. These will both be familiar to anyone who's used any of the last few generations of Windows operating systems, though the 'Defragment and Optimize Drives' tools have now been reconfigured to cope with the increasing popularity of solid-state drives and will no longer try to persuade you to wear them down with unnecessary defrags.

'Disk Cleanup' is the same old one-stop shop for quickly clearing up after the vagaries of the operating system and removing the temporary files that make such a mess of your storage drives.

Another admin tool that remains unchanged in the new operating system is Windows Firewall with Advanced Security. Here you can amend any rules associated with your current firewall settings and create, import and export different policies wholesale. You can also jump straight into the 'Network and Internet Diagnostics' page, which gives you immediate access to the 'Printer Troubleshooter'.

'System Configuration', which you may know as msconfig, has been moved into the 'Admin Tools' area. For years, this utility has been our go-to option for altering boot options from within Windows, like removing the boot GUI or starting in diagnostic mode. It was also where we decided what programs would load into the OS at startup.

No longer. The 'Startup' tab displays a link labelled 'Open Task Manager'. That's right, it's had a promotion. You can use the 'Startup' tab see what impact each app has on startup, and disable or enable them with a couple of clicks.

HIGH PERFORMANCE

That's not the only new addition to the Task Manager, though. The 'Performance' tab has also received a serious overhaul and it now gives you full performance information about your CPU, RAM, storage and networks (LAN and Wi-Fi). The 'App History' tab also provides valuable details, but only delivers reports on Modern UI applications that have been running.

Microsoft has made great strides in improving the support it gives power users, and has made the necessary information and applications easier to find than ever. It has provided a host of options to help you keep on top of your OS and tailor it to your specific needs, and Windows 8 gives you pretty much all the tools you could ever need. ■

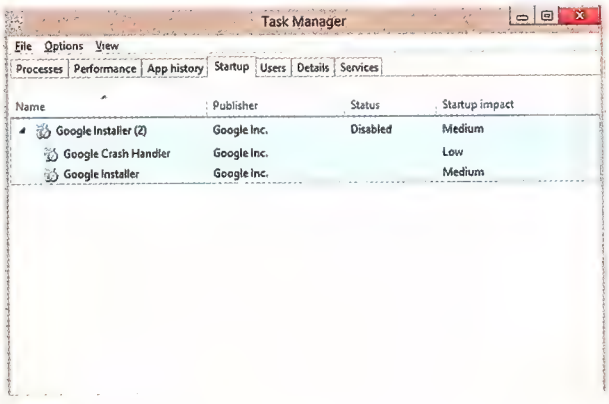
The new user menu is even more powerful than the old 'Start' button.

FIND THE 'START' MENU

There was a lot of consternation from the technology community when we took our first steps into the brave new world of Windows 8, and much of that was focused around the fact that we no longer had the 'Start' button as the anchor for our OS. For the first time since Windows 95, there was no instant access button that gave us a portal to our machine. Windows 8 doesn't really have a 'Start' button anymore (unless you count the now incredibly handy Windows keyboard key), but it does have something that's actually a lot simpler and perhaps even more useful: the powerful user menu that's available no matter where you are within your OS. Whether you're browsing through the weather on a Modern UI app or messing about in desktop mode, it's just a single click away. To bring up the menu, just move your mouse pointer into the bottom-left of the screen and right-click. This will bring up a menu packed with useful things like 'Task Manager', 'Power Options' and 'Command Prompt'.

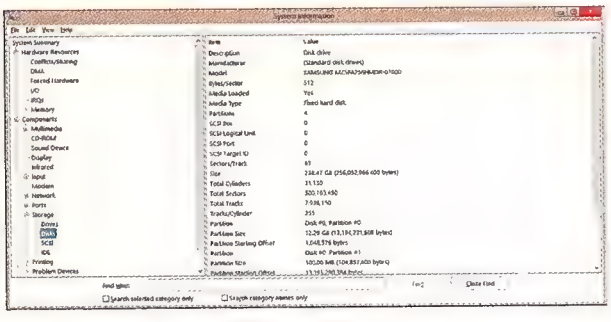
TOOL TIME

The top six tools for setting and looking after your PC.


Task Manager
File Options View
Processes Performance App history Startup Users Details Services
Name Publisher Status Startup impact
Google Installer (2) Google Inc. Disabled Medium
Google Crash Handler Google Inc. Low
Google Installer Google Inc. Medium

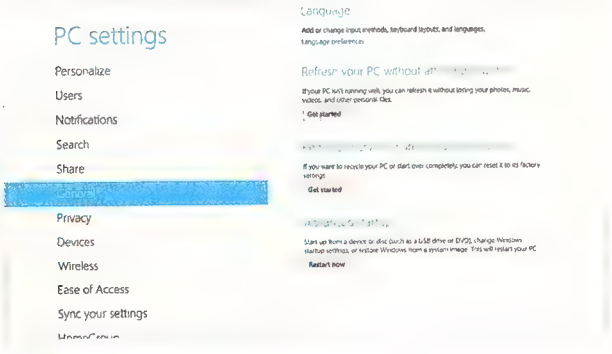
STARTUP

01 Once hidden within the depths of msconfig, the 'Startup' tab now lives in the new Task Manager. It still has the same level of functionality as before, allowing you to customise which programs load on boot, but it's now much easier to access. You also travel directly to the file location to see a rundown of the impact it has on your boot.



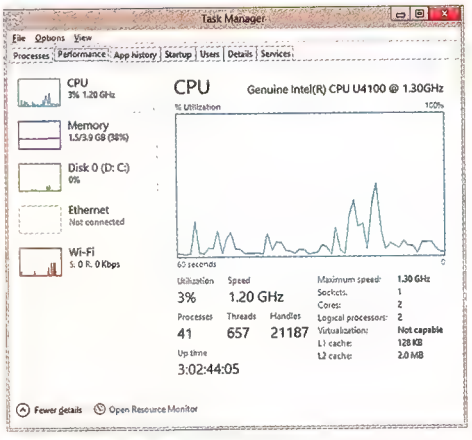
SYSTEM INFORMATION

03 If you don't necessarily want to know how your machine is performing, but are looking for the details of your PC's components (from a software or hardware perspective), the 'System Information' screen is perfect. It will give you the full lowdown on every facet of your machine, from the drivers for your mouse to the layout of your drive partitions.



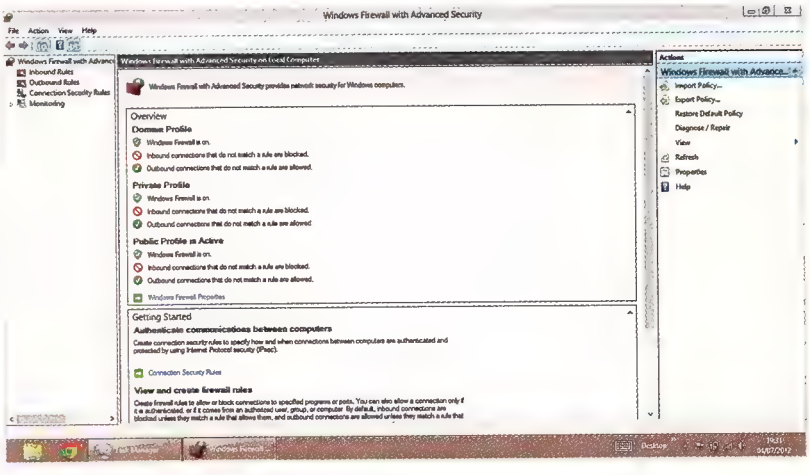
BOOT INTO SAFE MODE

05 Boot times in Windows 8 have improved, but with an SSD installed as a boot drive it can be tricky to boot into Safe Mode. Luckily, you can access it via 'Advanced Boot Options', which is accessible through the extra settings on the Charms bar. If you hit 'Advanced Startup' under the 'General' tab, the PC will restart into Windows 8's debug mode.



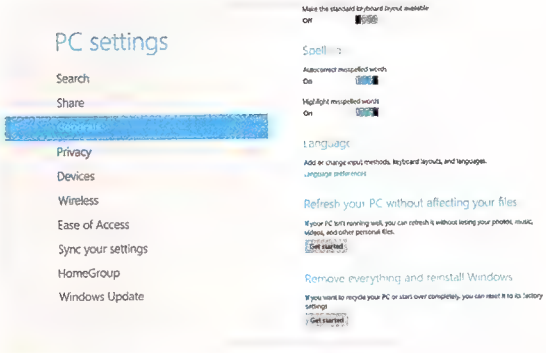
PERFORMANCE

02 This is another example of the improvements Microsoft has made to the Task Manager. Previously you only got a graph of CPU usage, with a little extra detail about memory. Now there's information about everything from processor speed to the read and write speeds of your drives. This will give you a great idea of how your machine is performing.


Windows Firewall with Advanced Security
File Action View Help
Windows Firewall with Advanced Security on Local Computer
Inbound Rules
Outbound Rules
Connection Security Rules
Monitoring
Overview
Domain Profile
Windows Firewall is on.
Inbound connections that do not match a rule are blocked.
Outbound connections that do not match a rule are allowed.
Private Profile
Windows Firewall is on.
Inbound connections that do not match a rule are blocked.
Outbound connections that do not match a rule are allowed.
Public Profile is Active
Windows Firewall is on.
Inbound connections that do not match a rule are blocked.
Outbound connections that do not match a rule are allowed.
Windows Firewall Properties
Getting Started
Authenticate communications between computers
Connection Security Rules
View and create firewall rules
Actions
Windows Firewall with Advanced...
Import Policy...
Export Policy...
Restore Default Policy
Diagnose / Repair
View
Refresh
Properties
Help

WINDOWS FIREWALL

04 Nothing has really changed with the latest iteration of Windows Firewall and Advanced Security. It's still the place to go to fully customise your firewall settings, whether you want to import new exception policies or diagnose any kind of network/security problems. It also allows you to monitor how your current network connection is configured.



RESET WINDOWS 8

06 Your PC now has a function similar to the factory reset option on your smartphone. Again, it's under the 'PC settings' screen on the Charms bar. It gives you two options: you can either refresh the PC without losing any of your personal files (like photos and music) or you can perform a total system reset, which will revert your PC back to its original state.

Getting the best out of foobar2000

foobar2000 is one of the best freeware audio players available for Windows. Mike Le Voi shows how to customise it to create the ideal media player.

YOU'LL NEED THIS

FOOBAR2000

Download the program from **www.foobar2000.org/download**.

While Windows Media Player does basic audio playback, a program like the free foobar2000 has much more advanced options for creating more sophisticated player. This player has many options that allow customisation of its GUI and the sound it can produce. Setting it up is quite straightforward – just download the installation file from **www.foobar2000.org/download**.

When you run the installation program, choose the 'Standard Installation' option. This creates all the settings, plug-ins, GUI layout and so on in the C:\Users\username\AppData\Roaming\foobar2000\ folder. Once you have foobar2000 tailored to your requirements, you can copy this folder from one PC to another.

The first time you run foobar2000, choose a default GUI layout. You'll then need to tell it to where your audio files are using 'File > Preferences > Media Library'. When foobar2000 has finished building the library database, you can sort the display by artist or album and filter the output using your selected keywords. For playback, drag the album and/or tracks you want to hear to the 'Default' playlist and then click the 'Play' button.

At this point, the sound will be fine, but the GUI leaves a lot to be desired! Quite honestly, this has to be one of the ugliest interfaces I've seen for a long time, but with some simple changes, you can make it much more appealing and useful.

GUI CUSTOMISATION

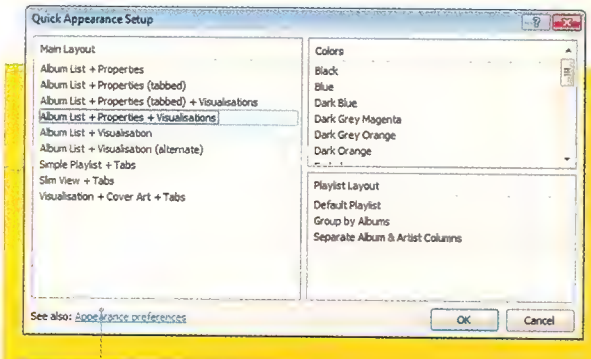
There are hundreds of plug-ins and optional components available for foobar2000. Many of them are available from the main component web site (**www.foobar2000.org/components**). For GUI customisation, I use Columns UI. Using this plug-in, you can define tabs to break up the display into more meaningful components, as well as use multiple filters for tags such as 'Composer', 'Artist', 'Album' and so on. It's not obvious how to define such a screen layout, so be prepared to experiment.

The program display can be customised further with small scripts. For example, I like to instantly see if an album is made up of .FLAC files or compressed files such as .MP3 or .WMA. To do this, insert the following script into the 'Style' tab for the 'Album' column:

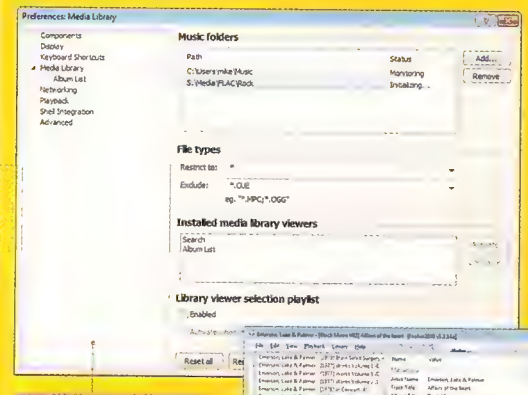
```
$set_style(text,$if($strcmp($info(encoding),lossless),$rgb(0,0,255),$rgb(255,0,0)),)
```

Using this script, the album name will be in blue for .FLAC files and red for .MP3 and .WMA.

There's also a great peak meter and spectrum display available for Columns UI (**tinyurl.com/dkwfec**). This display can be tailored to show peak or RMS values as well as a spectrum analysis using bands of your choosing. There are many more ways to customise foobar2000 to your own taste – go to **tinyurl.com/ckpnex** for more information.



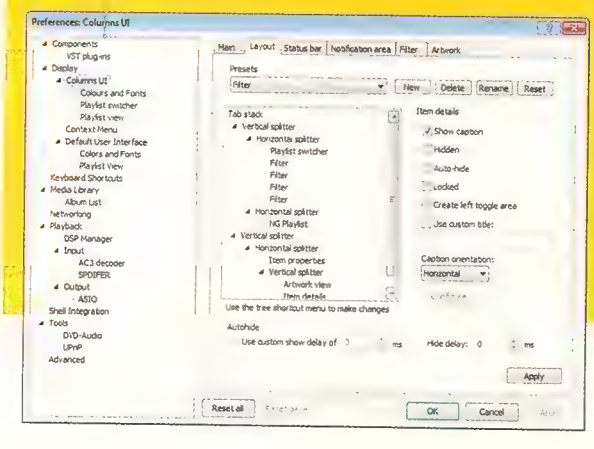
When you first run foobar2000, choose a default GUI layout.

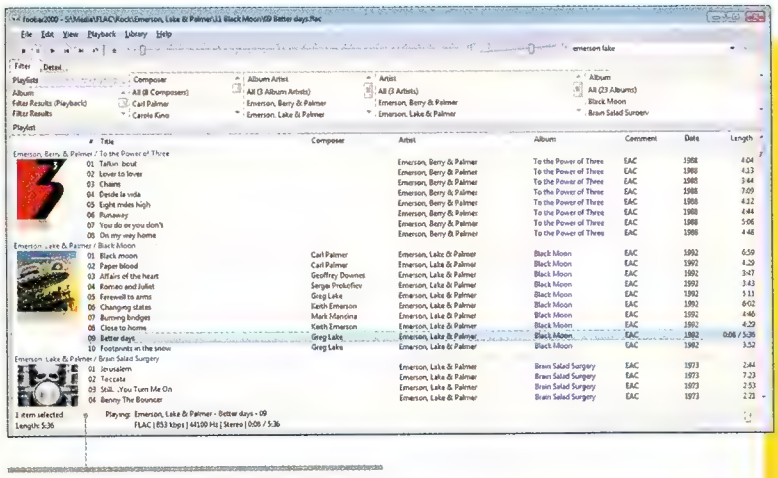


You'll need to tell the program where to find your audio files.

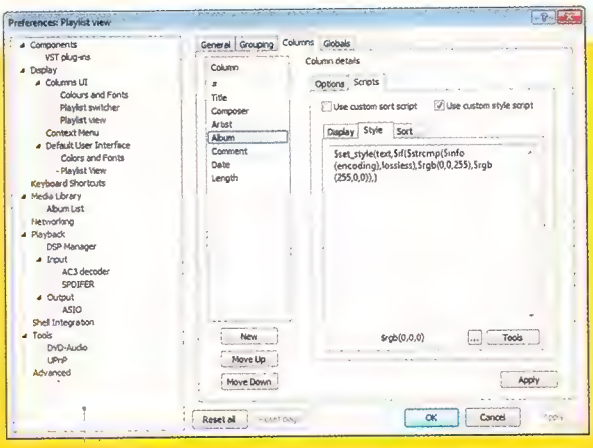
Be prepared to experiment with your screen layout.

Simply drag and drop the songs you want to hear into the playlist.

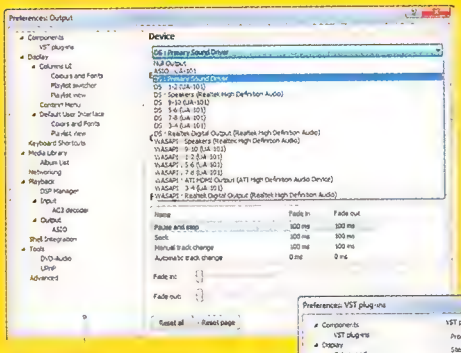




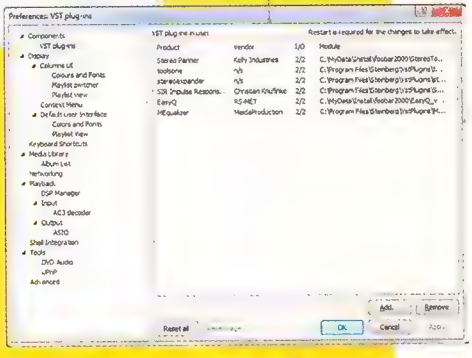
The Columns UI plug-in adds tabs to break up the default foobar2000 display.



The display can be customised further with small scripts.

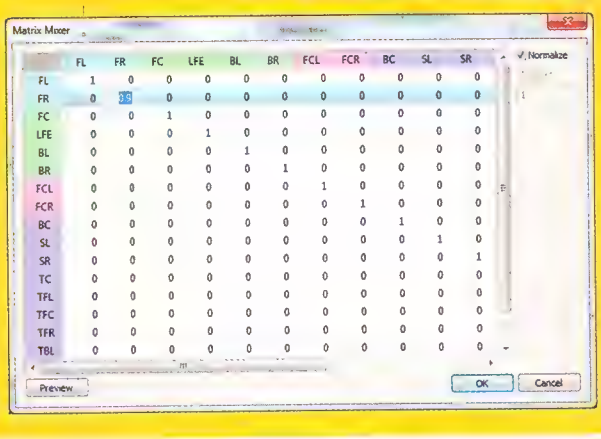


SIR and MEqualizer are two VST plug-ins worth installing.



The standard foobar2000 output uses Windows DirectSound.

Matrix Mixer can be used to control the elements of up to 18-channel audio.



AUDIO COMPONENTS

By default, foobar2000 can play the common audio formats such as WAV, FLAC, MP3, AAC, WMA and so on. For specialised file formats you can download other components. I use the AC-3 and DTS decoder components, which are available from the main component web site. Note that almost all the components are designed to play back stereo files, so multitrack AC-3 and DTS files will be played as a stereo downmix by default. If you want to play surround sound files as is, you'll need S/PDIF output from your PC and the component called Windows 7 SPDIFER (available from **tinyurl.com/8ty6jnv**). Note that some of this stuff is quite experimental, so be careful and experiment with the volume turned down!

SOUND QUALITY

The standard foobar2000 output uses Windows DirectSound, although you'll need to download and install WASAPI and/or ASIO support if necessary. This is because with DirectSound the Windows Mixer will mix all sound inputs, change the volume and perform sample rate conversion (say, from 48KHz to 44.1KHz), if required.

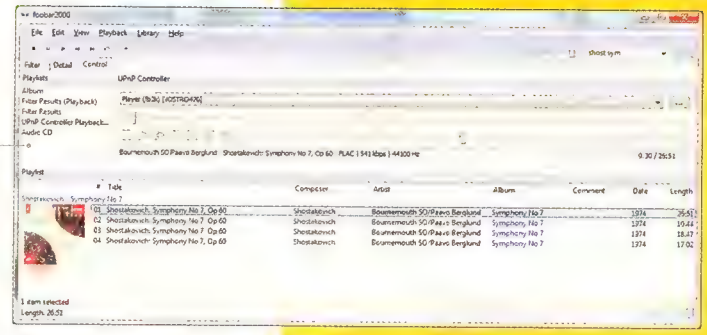
However, WASAPI is an improvement over DirectSound as it bypasses the Windows Mixer and allows bit-perfect output as well as exclusive use of the sound module during audio playback. Meanwhile, ASIO is normally used for high-end sound modules. The author of foobar2000 has stated that there's no need to use ASIO unless your sound module doesn't support WASAPI or DirectSound. Indeed, there are many claims and counterclaims in the audiophile community as to whether the sound quality of DirectSound is worse than WASAPI or ASIO.

If you want to compare different sound files for better or worse sound quality, foobar2000 has a component called ABX Comparator, which can perform a double-blind listening test of a .FLAC file and an .MP3 file created from the same original .WAV file, for example. However, attempting to compare DirectSound and WASAPI involves stopping playback, changing the output option and then listening to the same track again. This is almost impossible to do without your own expectations affecting the result. Therefore, my recommendation is to use WASAPI if possible, but only because it bypasses any sample rate conversion that could be introduced by the Windows Mixer. Since the sample rate of almost all your audio files is likely to be 44.1KHz, you can safely use DirectSound as long as your sound module is set to the default of 44.1KHz as well.

AUDIO PLUG-INS

The other great feature of foobar2000 is its ability to use plug-ins to enhance or manipulate the sound. You can even use VST plug-ins if you install the VST component (**tinyurl.com/3qf9l47**). As Wikipedia so nicely puts it, VST (or Virtual Studio Technology) is an interface for integrating software audio synthesizer and effect plug-ins with audio editors and hard disk recording systems. It uses digital signal processing (DSP) to simulate traditional recording studio hardware. Once the VST Adapter has been installed, you can add or remove VST plug-ins, including such useful ones as SIR and MEqualizer, which we've discussed previously (see *APC* September, page 119).

There are also native foobar2000 plug-ins that can be installed. One of my favourites is Matrix Mixer (**tinyurl.com/3eey4cb**). It can be used to control the mixing elements of up to 18-channel audio, but my usage is much simpler. My monitor speakers aren't evenly balanced and the right speaker is slightly louder than the left. I use Matrix Mixer to fix this: the right speaker is set to 90% of the volume of the left speaker,



Select the files you want to play, right-click and choose 'UPnP Controller' to play them on the other PC.

irrespective of the settings in the Windows Volume Control.

Another simple yet useful DSP is VLevel, which is available from **tinyurl.com/9db4g6q**. It's a very simple yet effective compressor, which you set and forget when you need to keep the volume at a pretty constant level for use as background music.

AUDIO VIA THE NETWORK

In Windows, it's easy to share files across the network so that a media player can access files from anywhere. However, what do you do if the media player PC is hooked up to your hi-fi and you're sitting at another PC?

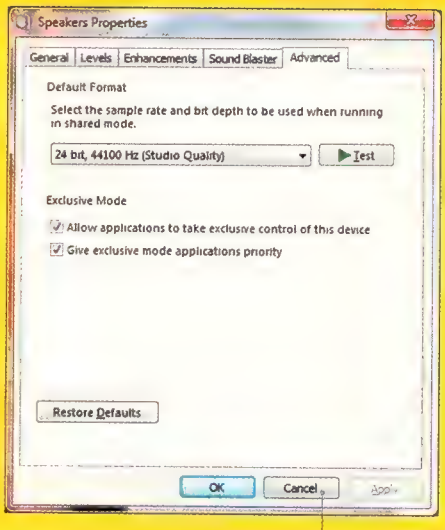
With foobar2000, the answer is easy – UpnP – which is a set of protocols that allow networked devices to communicate. Install foobar2000 on both PCs and then download the UPnP component from the main component web site, then install and configure UPnP on each PC.

On one PC, say the one you're working on, you configure it as a library server and start the Media Server in the 'UPnP Server Basic Settings' section in foobar2000's preferences. On the PC connected to your hi-hi, you don't need to start the Media Server; instead, start the Media Renderer. When both servers have started, you'll see a Windows Explorer display something like the screenshot on the right. Simply select the files you want to play, then right-click, select 'UPnP Controller' and play them on the other PC. There is an optional GUI panel in foobar2000 that you can configure using the Columns UI interface to easily control playback.

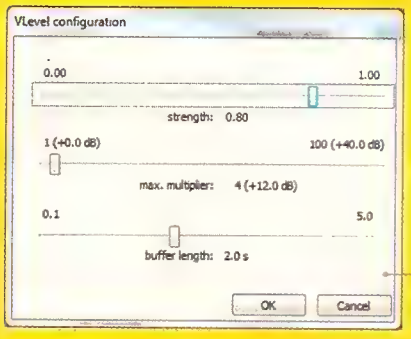
There's only one drawback to playing audio via UPnP and that's gapless playback. This is because the UPnP controller tells the Media Renderer to play one file after another, based on when a file stops playing. If you really need gapless playback, you have to do this via 'Playback Stream Capture'. What isn't obvious in foobar2000 is that when you start 'Playback Stream Capture' via the UPnP controller, you hear nothing on the remote PC! You then have to start playback via the normal controls in foobar2000 and the playback will be routed to the remote PC as well as to your local speakers. For this reason, you'll almost certainly want to mute your local PC speakers when doing this.

CONCLUSION

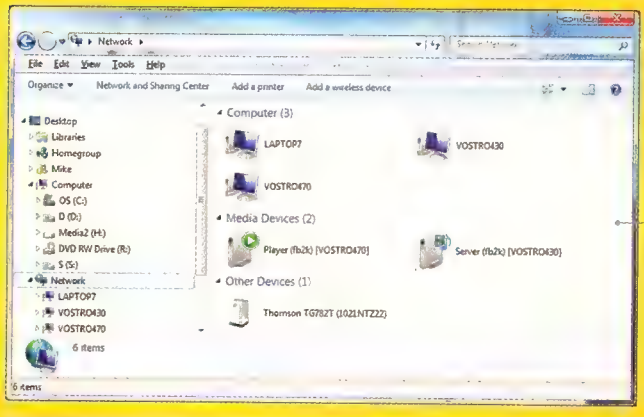
In this article we've discussed how to set up foobar2000 for maximum performance and sound quality. I hope this encourages you to use this great player for listening to your audio files!



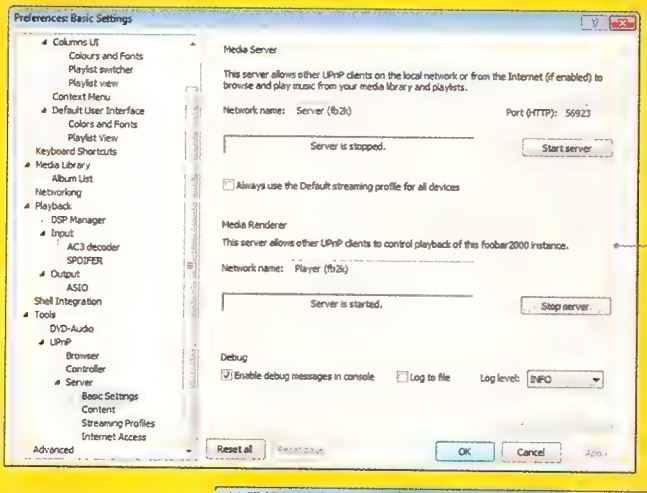
You can safely use DirectSound if your sound module is set to 44.1KHz.



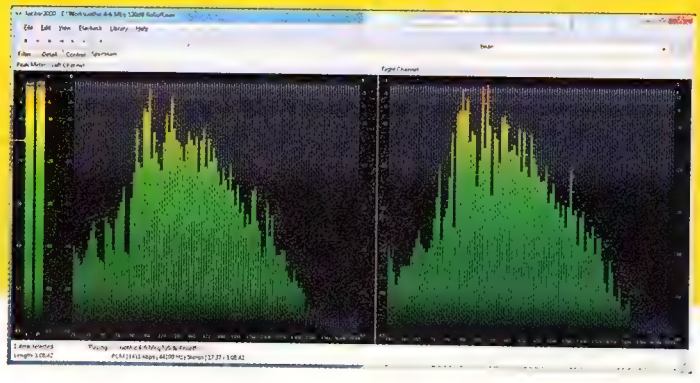
VLevel is great when you need to keep the volume at a fairly constant level.



You'll see something like this once both PCs are connected.


Preferences: Basic Settings
Media Server
This server allows other UPnP clients on the local network or from the Internet (if enabled) to browse and play music from your media library and playlists.
Network name: Server (fb2k)
Port (HTTP): 56923
Server is stopped.
Start server
Always use the Default streaming profile for all devices
Media Renderer
This server allows other UPnP clients to control playback of this foobar2000 instance.
Network name: Player (fb2k)
Server is started.
Stop server
Debug
Enable debug messages in console
Log to file
Log level: INFO
Reset all
OK
Cancel

On the PC connected to your hi-fi, you need to start the Media Renderer.



This display can be tailored to show peak or RMS values as well a spectrum analysis.

HTML PART 4

Better, smarter forms

In our continuing HTML5 masterclass, John Allsopp explains how to build better web interfaces using the newest revision of the markup language.

APC EXPERT

JOHN ALLSOPP

With a background in computer science and mathematics – and a great deal of good fortune – John Allsopp's life collided with the web in the early '90s. For nearly 20 years he has developed software for web developers, built web sites and apps, and written books, countless articles and tutorials for print and online publications. In 2000, he wrote *A Dao of Web Design*, which over a decade later continues to be widely cited as the theoretical foundation for Responsive Web Design.

CODE BY

NEON THREE

Neon Three is a specialist studio focusing on web, mobile and user interaction design. The three members of this team – Scott, Toby and Matt – all have a passion for design and new technologies. Each team member brings a unique skillset to a project enabling a multidimensional approach to creative problem solving, hence why we've recruited them for this project.

In the previous masterclass, we looked at some of the new HTML5 forms features and saw they aren't just for web forms anymore. Increasingly many 'native' apps for tablets and mobile devices are built with HTML5, such as LinkedIn's native iPad application, for instance.

In this article, we'll build on what we covered previously and learn how to make our web interfaces (whether they're traditional forms or more like application UIs) smarter and better for our users, with less work for us as developers. What's not to like?

I'M SORRY DAVE, I CAN'T LET YOU DO THAT

Think of the number of times you've filled in a web-based form, clicked the 'Submit' button and waited, only to be told seconds or more later that a required field is missing, or the format of some input is incorrect. Good user interfaces guide the user, catching our errors even before we make them. Really good interfaces make the user do as little work as possible, which starts with only asking them for the information that's really needed: is that after hours contact fax really required?

A good user interface adapts to the user's input. If not all of the required fields are filled, or the user has an error in some of their input, why enable the 'Submit' button? A disabled 'Submit' button is typically a very good indicator that something still needs to be done.

So let's look at how we can build user interfaces that adapt to the user's input and guides them, prompting (or better still, subtly nudging) them for required information, or the correct format for certain kinds of information.

VALID INPUT

You'll recall from the last article that with HTML5, certain types of input are automatically validated by the browser. We saw that inputs of type `email`, `url` and `number`, as well as `date` and `time` input types will be validated by the browser as users enter information. That's great, but what we didn't learn is what we as developers can do with this feature. We'll cover that in just a moment, but first we'll look at another way we as developers can validate the user's input.

What if we want to check that the user's password matches a certain pattern (only upper- and lower-case letters plus numbers, for example)? Or that a credit card number matches a particular format. In the past we'd have needed to use JavaScript to check the value of an input element after the user entered some value. Now we can use the `pattern` attribute in HTML5 to specify a regular expression that the content must match in order to be valid.

A regular expression (or regex) is a way of specifying patterns of numbers, letters and other characters. They can appear a little daunting at first glance – for example, the pattern for a string with only numbers in it is `[0..9]*)` – but you can find many examples of regular expressions for all kinds of patterns (from Japanese addresses to telephone numbers in Mozambique) online, and learning the basics of regular expressions is a couple of hours' work, which will be well rewarded.

To use the `pattern` attribute, we just put the regular expression pattern we want our input to match as the value of the `pattern` attribute for the element. For example, if we want our input to be only numbers, we'd use `<input pattern="[0..9]*">`.

This might look like a bit of an artificial example, because we already have `inputs` of type `number`. But there's an added benefit of adding this pattern to either inputs of type `text` or `number`. Below is the virtual keyboard you'll get with iPhones if you use that pattern.

This is a lot like the virtual keyboard for the `tel` input, but would be useful when you only want numbers as input.

BUT WHAT CAN I DO WITH IT?

So, we can specify the types of input we want with either types of `input` element, or using the `pattern` attribute. But how exactly does that help us? That's where some new features of CSS come in, which enable us to style elements based on whether they're valid.

If you've used CSS at all, you'll have seen the `:hover` selector (for example, `a:hover`), which lets us style links when the mouse is over them. CSS now includes selectors for when an element has `valid` or `invalid` input. So, we can style an element with invalid input using the following CSS:

Virtual keyboard on the iPhone for `pattern='[0..9]*'`.

```
input:invalid {
        color: red
}
```

This would style the text of any input element red, which is probably not ideal from a user experience or accessibility perspective. However, let's take a look at some ways we could use these selectors to style invalid input.

The first thing we might like to do to alert our user to invalid input is use an alert icon to draw their attention to those fields. Here we'll use a background image on an input element to show an alert when the value is invalid.

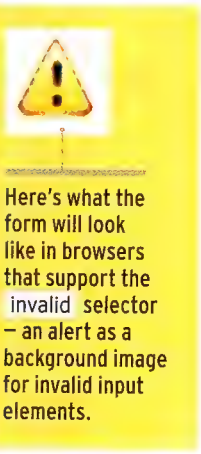
```
input:invalid{
        background-image: url("images/alert.png");
        background-repeat: no-repeat;
        background-position: center right
}
```

Let's break this down.

- `input:invalid` selects any input element with invalid input.
- `background-image: url("images/alert.png");` sets the background image of these elements to the image `alert.png`.
- `background-repeat: no-repeat;` specifies that we don't want the image repeated.
- `background-position: center right` specifies that the image should be positioned to the right of the input element as well as vertically centred.

Let's look at the `valid` selector. This selects elements with valid content. We could, for example, add a tick icon to indicate which inputs are valid.

```
input:valid{
        background-image: url("images/tick.
png");
        background-repeat: no-repeat;
        background-position: center right
}
```



Here's what the form will look like in browsers that support the `invalid` selector – an alert as a background image for invalid input elements.

If the user hasn't entered anything in a field, no input is valid for `input` elements, which is likely not what we want. This brings us to another HTML5 feature we saw last time, the `required` attribute.

REQUIRED INPUT

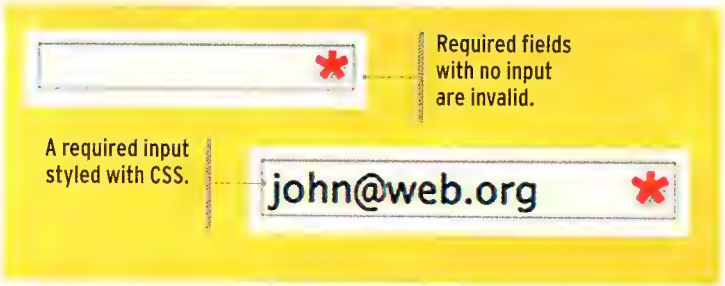
Typically, a form will have some required information the user must input and as we saw last time, the `required` attribute allows us to specify which inputs must be completed by the user. This brings with it two benefits. First, we can style required fields differently from other elements, using CSS. And an added bonus is that required fields without any input are invalid. Let's see how we can use this to make our forms and web interfaces more user friendly.

We'll start by simply adding the `required` attribute to our input:

```
<input type='email' required>
```

If there's no input for this field, it's no longer valid, so our `invalid` selector will select the element and give it our background alert, rather than the background tick.

Once the user has given us a valid email address, there'll be a tick as a background image.
Here, leaving a field blank is a valid input, which is probably not what we want.



Just as the `invalid` selector chooses an input with an invalid value, the selector `input:required` selects any element that has the required attribute set. That is, any input element like this: `<input required>`. So, if we want to style required fields differently when they're not filled, we can create a special style:

```
input:required{
        background-image: url("images/required.png");
        background-repeat: no-repeat;
        background-position: center right
}
```

Depending on the *order* of your CSS, even when the field is filled it will still be styled as required. That's because one of the principles of CSS is that statements further down the style sheet override those above them (there are other rules of, course, but for now this is the important one). So we can make sure our `:valid` rule appears below the `:required` one so it will override it. When the field is empty, the required rule wins and once the field is filled, it's no longer invalid and the required rule wins.

BONUS CSS SELECTORS FOR HTML5

CSS selectors can be combined, so we can create a rule that only applies to invalid elements that are required, like so: `input:required:invalid {}` and valid required input elements: `input:required:valid {}`. Using these statements, the order of the style sheets doesn't matter.

BONUS SELECTORS

CSS provides not just the `valid`, `invalid` and `required` selectors, but a number of others as well, including the following. `:optional` selects elements that aren't required. `:in-range` selects an element that takes a number value that's within the range set for it (greater than or equal to its minimum and less than or equal to its maximum). `:out-of-range` selects an element that takes a number value with a value outside its range. `:enabled` selects an element when it's enabled (`disabled=false`). `:disabled` selects an element when it's disabled (`disabled=true`).

A LITTLE BIT OF JAVASCRIPT

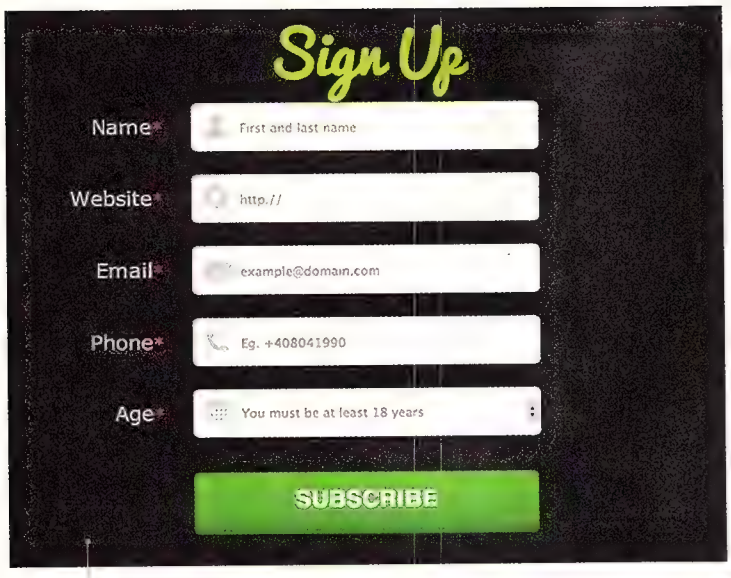
If you're comfortable with JavaScript and the DOM (Document Object Model), you can take HTML5 forms further. Via the DOM, you can set custom messages to be displayed and determine not just whether a form field is valid or invalid, but the reason why – it could be whether a number value is within range, like the CSS selectors we just saw. If JavaScript and the DOM is your thing, there's more at the Mozilla Developer Network (**tinyurl.com/cqj354g**).

A NOTE ON SECURITY

There's been some suggestion that HTML5 forms open up new potential security threats. However, if you follow the golden rule with all client-side forms and don't rely on client-side form validation (that is, if the information a user provides via a form is always validated and sanitised on the server), then HTML5 opens no new security risks in this regard. HTML5 form validation is simply there for the convenience of users, not for security.

A NOTE ON ACCESSIBILITY

The techniques we've used for styling invalid and required fields won't make our forms or interfaces accessible for people using screen readers because they rely purely on visual cues. We'll still need to consider how to convey information to those users with the sort of techniques we've



This is how our template will appear.

long used for this purpose. A good overview can be found at WebAIM (**webaim.org**) and Web Usability (**tinyurl.com/q4ybkq**). As with all new web technologies, it's our ethical responsibility as professionals to ensure the 'world wide' part of www is maintained.

THIS MONTH'S TEMPLATE

Once again, the design wunderkinds at Neon Three has whipped up a tasty-looking design and it's more than skin deep. Download it from **apcmag.com/html5-masterclass.htm**.

NAME, NUMBER & AGE

While I wouldn't recommend using every one of the following techniques, it's nonetheless a great example of an interface responding to and guiding the user.

We start with a 'Name' field, which makes sure you input a first and last name by requiring the input to be at least two alphanumeric characters long (allowing for spaces and hyphens using the pattern attribute) plus a regular expression:

```
<input name="name" type="text" placeholder="First and last name"
pattern="[a-zA-Z0-9\b]{2,}" title="Minimum at least 2 characters"
required>
```

The regular expression could be much more sophisticated and it may be overkill, but this is a good example of what's possible with the pattern attribute.

The input for the web site uses the type url for an input. A little gotcha here is that browsers require "/" as the start of the input value for it to be valid. It's not ideal, and it's something you could work around with JavaScript if you wanted to.

```
<input name="website" type="url" placeholder="/" title="Your website
address must start with / novalidate required >
```

Next up we have a field for the user's email address, this time an input of type email .

```
<input name="email" type="email" placeholder="example@domain.com"
required>
```

The input for the phone number uses the type tel , of course, but we've also added a pattern to check whether the user has added the number correctly.

```
<input name="phone" type="tel" placeholder="Eg. +408041990"
pattern="[0-9]{10}" min="8" maxlength="12" required>
```

This pattern is overly simple, requiring a maximum of integers and only integers. In the real world, even for just Australian numbers, we would need to match mobile numbers, area codes and probably the international prefix for Australia, as well as allowing for spaces in the number, which is how mobile numbers are typically written. Once again, it's a good example of what's possible, but certainly not a pattern to use out of the box, and it's an approach to use with caution.

Lastly, we ask for the user's age, with a minimum age of 18:

```
<input id="agevalidate" name="age" type="number"
placeholder="You must be at least 18 years" min="18" max="122"
maxlength="3" required>
```

We've assumed no-one will ever be older than 122, so it's possible that this code will need to be rewritten, though not before 2018 – the world's oldest person, Besse Cooper, is 116.

HOW ABOUT THE STYLING?

If you use the form, rather than just gaze on its beauty, you'll notice that indications about the validity of input are only provided when an input has the keyboard focus. Whether this is the optimal approach to usability needs to be considered carefully, but it does let us demonstrate how we can effectively chain selectors together to make them quite specific:

```
input:focus:required:invalid {}
```

Here we select elements only when they have the keyboard focus, are required and their input is invalid.

NEXT MASTERCLASS

Next up, we'll look at how we can add some sizzle to our steak, with all kinds of CSS3 features, including rounded corners, shadows, gradients, transparency and more. You'll find out why designers everywhere are ditching bitmap images and designing directly in the browser. It's a huge bonus in this age of increasingly mobile web use, device form factor fragmentation and ever higher screen resolutions.

PART 2

Put Arduino to work

Continuing with our Arduino microcontroller series, this month Darren Yates shows you how build a weather station that measures and displays temperature and humidity.

PROJECT 2 LED weather station

APC EXPERT

DARREN YATES

Darren is a multi-award-winning journalist who started building and testing computers in the early '90s. He's developed a range of PC software, including PC User's UserBench benchmark series starting in 2005, its UserOS Linux distros in 2008 and is now working on new benchmarks for Android when he's not busy writing or torturing hardware with his soldering iron.

Last month, we started our series by upping the 'Hello, world' project of flashing the Arduino's built-in LED into our own digital dice. This month, we're cracking on to build a weather station that measures temperature in degrees Celsius and relative humidity as a percentage. We'll introduce new components and theory, and put the lot into practice.

SEVEN-SEGMENT DISPLAYS

LEDs on their own are great indicators, but to display quantitative information, we need something more and that's where seven-segment displays come in. These are blocks with seven LEDs arranged into a figure eight, each individually controllable. As we described last month, LEDs have two connections: an anode (A) and a cathode (K). When current flows from anode to cathode, the LED lights up. However, to reduce the display pin count from 14 to 10, most displays have either all of their anodes or cathodes joined together to a single pin – they're known as common anode or common cathode displays.

We'll be using the LTS543R common cathode type – they're a garden variety display and the most complicated part of using them is knowing the pin layout. Here's how you do it: hold the display in front of you with the decimal point LED at the bottom-right. The bottom-left pin at the back is pin 1, counting right to pin 5, and the top-right pin is pin 6, counting left to pin 10.

DRIVING SEVEN-SEGMENT DISPLAYS

To drive a seven-segment display, you need seven data lines from an Arduino to control the seven LEDs. If you add a second display, you'll need another seven data lines. A third is another seven. So you can see the control pin count can skyrocket if we keep using this system.

Our weather station uses two displays and while the Arduino Uno R3 has 14 outputs to play with, we're going to do it with just nine, using a technique known as multiplexing. Put simply, it's a way of being able to send data to different devices over the one set of control lines (data bus) using a time-share system. A simple analogy is driving your car: you (probably) don't have your own dedicated roads, you use the same roads as everyone else. If you think of it in the time domain, you're time-sharing a road for the time you're on it. What we're doing is similar – we're multiplexing 14 LEDs' worth of data over a seven-bit data bus using a similar time-share method.

MULTIPLEXING

We're going to need another two control lines to make it work. This is also a good time to introduce you to another new component: the transistor. Your average Ivy Bridge-class Core i5 processor has 1.4 billion of these things and we need just two. Transistors are clever little devices that can amplify a signal and act like controllable switches. In every case, a transistor lets you control a larger current with a smaller one. If you follow the circuit diagram, we're using them as

PROJECT-SPECIFIC PARTS

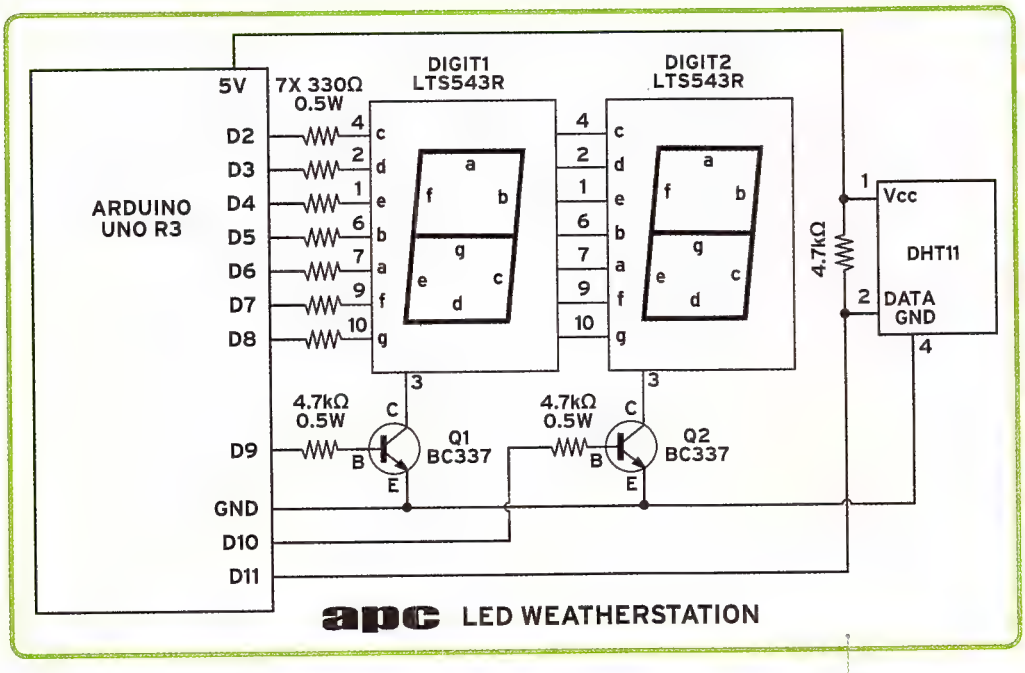
You'll need the standard parts (Arduino board, breadboard, wires, pliers and so on), along with these extras:

- DHT11 temperature/humidity sensor
- 7 x 330-ohm/0.5W metal film resistors
- 3 x 4.7k-ohm/0.5W metal film resistors
- 2 x BC337 NPN transistors
- 2 x LTS543R or FND500 common cathode seven-segment displays

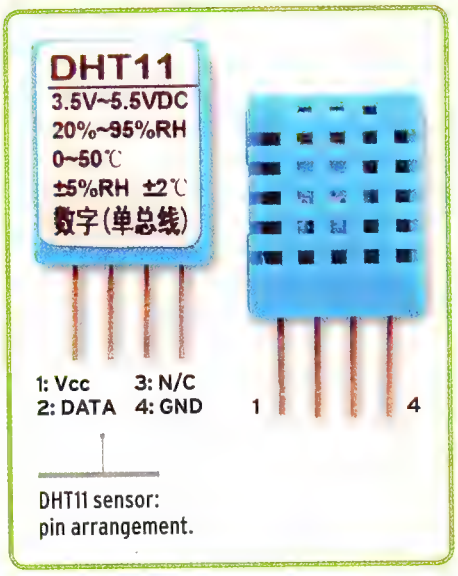
They shouldn't cost you more than **$15 all up** and you can get everything bar the DHT11 from Jaycar Electronics.

TECH CORNER
Building the weather station

The wiring is the trickiest part of this project. Just make sure you follow the colour coding on our wiring diagram right, as it identifies which wire goes to which pin without clogging up the diagram. The circuit diagram will give you the reference point if you get lost. Keep checking things as you go. The displays, transistors and DHT11 module must be installed the right way around or the project won't work, so again, follow the overlay diagram carefully. If you've noticed the unusual wires we've used, they're sometimes called Dupont wires – we bought ours from eBay (search for **breadboard jumper cable** for around $4 for 65 assorted lengths. Alternatively, grab an Arduino Experimenters Kit – Jaycar has the Freetronics version (*cat. number XC4262*) for $90 or you can get a simpler version from Australian Robotics (**tinyurl.com/8ovazh9**) for $46. You'll still need the extra parts in the parts list, though.



Basic circuit for our LED weather station.



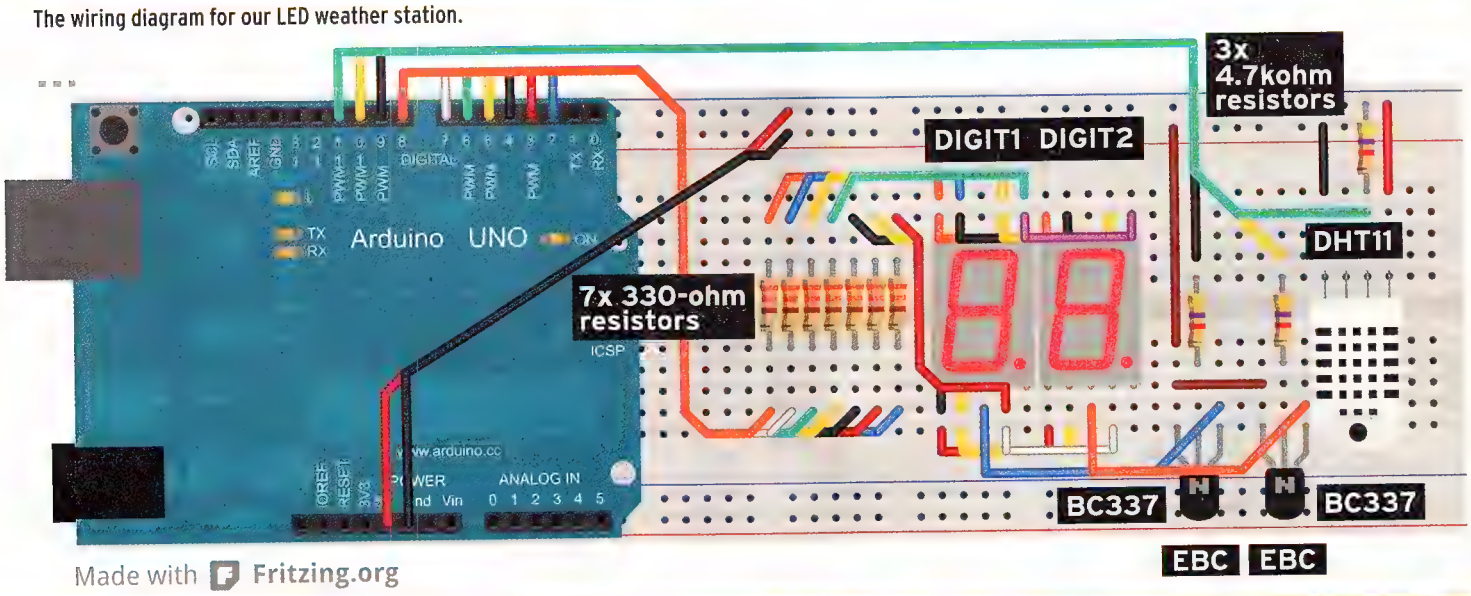
DHT11 sensor: pin arrangement.

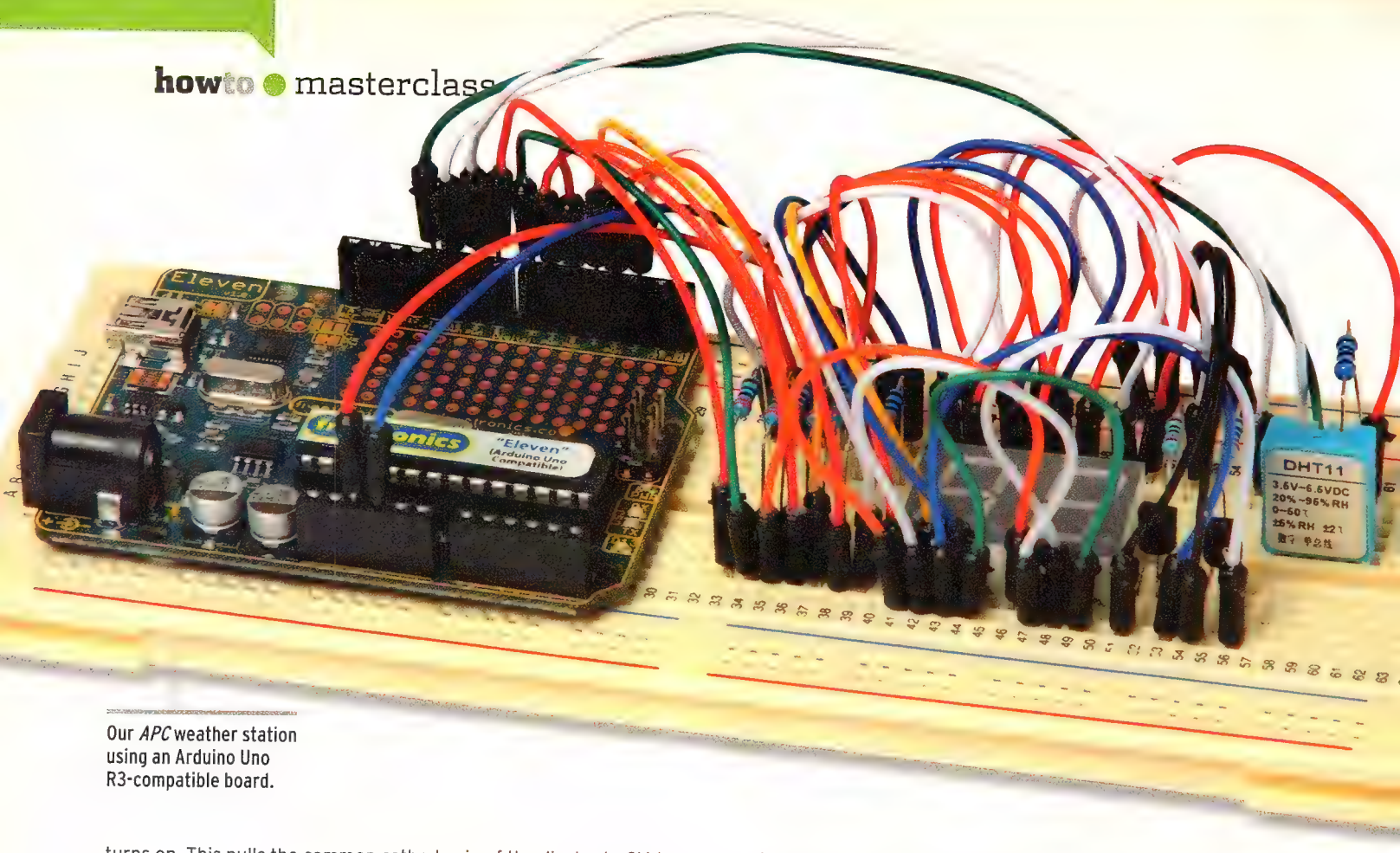
switches, connected to the common cathode pin of each display.

The transistor in our circuit is a BC337 NPN medium-signal transistor. It's a garden variety three-pin device and here's how to tell the pins: hold the transistor flat-face facing you, with the pins pointing down. The pin on the left is known as the collector (C), the pin on the right is the emitter (E) and the one in the middle is the base (B). You could write two books on transistor theory but for now, that'll do.

So quickly, here's how the whole multiplexing thing works. When we want a number to appear on DIGIT1, we send output D9 high (meaning its voltage rises to the 5V supply rail). This sends current through the 4.7-kohm limiting resistor into the base of transistor Q1, it activates and

The wiring diagram for our LED weather station.





Our *APC* weather station using an Arduino Uno R3-compatible board.

turns on. This pulls the common cathode pin of the display to 0V (or ground) to get the LEDs ready to light up. We then send the data for that digit on the seven control lines D2 to D8 and the display will light up with the number. To display a number on DIGIT2, we do the reverse. We send data output D9 low, which turns off Q1 and DIGIT1. We pull output D10 high, turning on the other transistor, which activates DIGIT2. We send the data on the outputs D2 to D8 again, but this time, DIGIT2 will light up.

WHAT'S THE POINT?

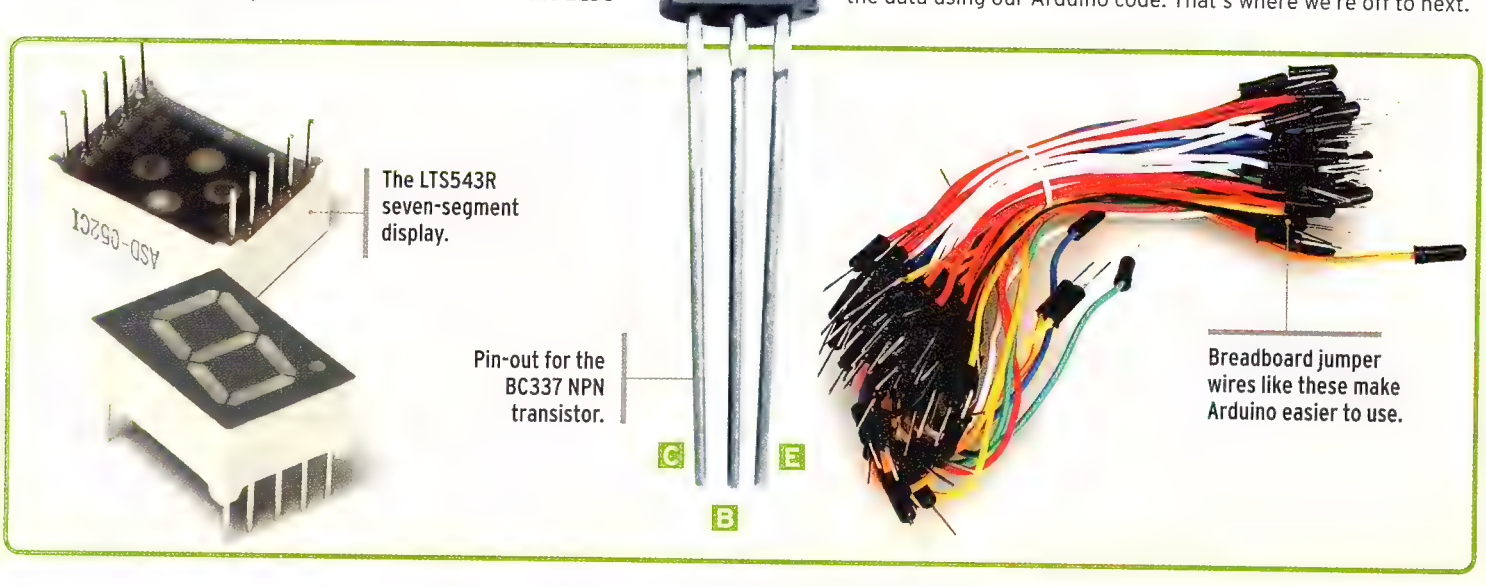
If you're thinking this is pointless because all we end up with is two alternately flashing displays, you're dead right. The trick is speed. Eyes are great at resolution, but they can't distinguish flashing objects much beyond about 75Hz. So if we can get this multiplexing speed up high enough, you won't see two flashing displays – they'll appear as though they're continuously lit. And that's exactly what we do in the Arduino code except that we push the multiplex rate up to 125Hz to make damn sure you can't see it!

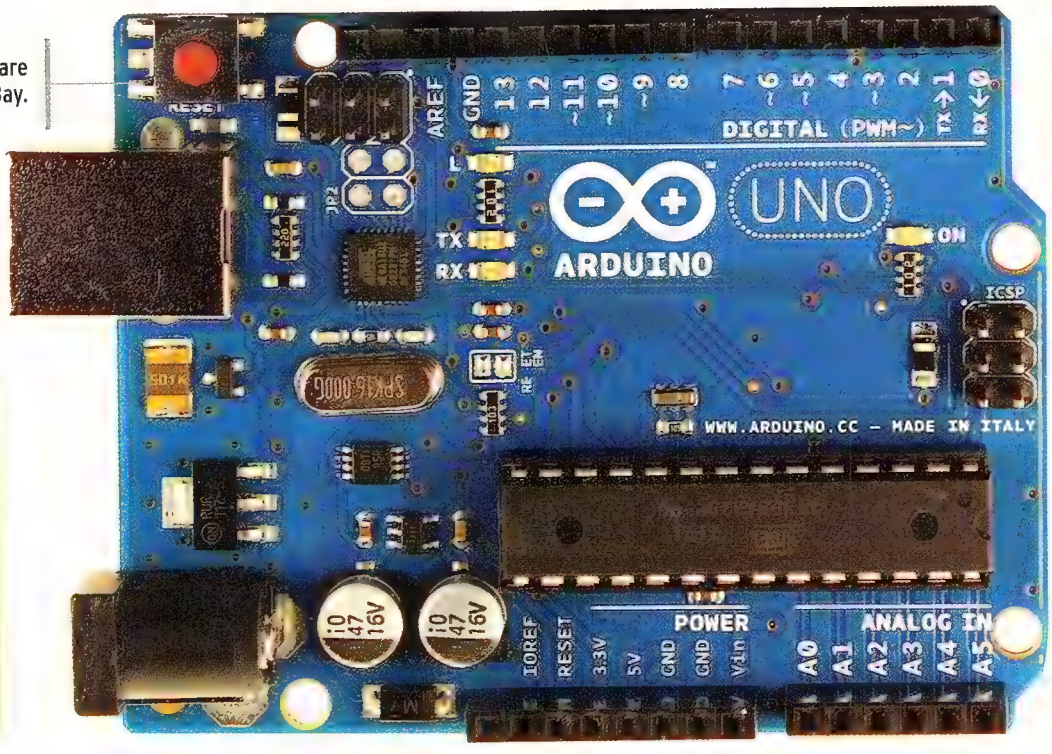
In the end, we're using nine data lines – seven for the LEDs in each display and two to control the displays themselves. Hopefully you can see we only need one extra data line for every new display we then add. (Technically, you can do the whole thing with just one data line, albeit with a lot more electronics than we have here.)

INTRODUCING THE DHT11

That takes care of the display side of things, but what about the temperature and humidity data? That's what the little DHT11 sensor provides. You can pick these up from eBay for under $3 or online from places like Australian Robotics (**www.australianrobotics.com.au**) with different pin-outs. It's basically a tiny four-pin brick with its own microcontroller, a hygrometer and negative temperature coefficient (NTC) thermistor that outputs its data in serial form.

To tell the pins, hold the DHT11 in front of you, pins down, with the label facing away from you. The left pin is pin 1 and connects to the supply rail, pin 2 is the data pin, pin 3 is not connected and pin 4 is 0V. We connect the DHT11's pin 2 to the Arduino's data line D11, which we configure as an input, and grab the data using our Arduino code. That's where we're off to next.





Arduino Uno boards are now less than $15 on eBay.

WHERE TO GET THE SOFTWARE

You can find the software for our weather station on the *APC* web site at **apcmag.com/arduino.htm**. Grab the 'weatherstation.zip' file, unzip it, copy the 'Timer1' and 'DHT' folders to your Arduino IDE's library path (**\Arduino-1.0.1\library**) and create a '**apc_02_weather**' folder for the '**apc_02_weather.ino**' sketch file.

Coding the weather station

With the hardware done, we show you what's needed to code your Arduino Uno board into a weather station.

There's a bit for our Arduino to do in this project. It has to retrieve the data stream from the DHT11 module and at the same time, multiplex our two seven-segment displays fast enough to ensure we don't see them flashing away. So rather than reinvent the wheel, we're going to use the help of others by incorporating a couple of open-source libraries to simplify some aspects of our project. That said, they only provide the nuts and bolts – we still have to pull everything together to make this thing work, which is what our sketch does.

DHT11 & TIMER1 LIBRARIES

The DHT11 uses its own proprietary one-line data port, which unfortunately doesn't follow any industry standards. Thankfully, we can use the DHT11Lib library (**tinyurl.com/9rs8jpy**) to do the tough stuff. We've slightly modified the version included in the .ZIP file to add more precision to the error codes so we're making it available under the GPL (General Public License). The library consists of two files: 'dht11.cpp' and 'dht11.h'.

The other library we need is the Timer1 library. The Atmel ATMEGA328P microcontroller has three built-in timers (two 8-bit and one 16-bit), which you can preset to give you different time delays. We're using Timer1, the 16-bit timer. When you have a 16MHz clock rate and you're only counting to 65,536 (that is, 2^{16}), it doesn't take long. That's why the ATMEGA328P also has a prescaler or divider to create longer delays (well, up to 9 seconds anyway).

The Timer1 library makes this easier to do, but also adds in a very useful feature called a timer overflow interrupt. Basically, once the timer has reached its timeout point, it fires off an interrupt signal to the microcontroller, just like a three-year-old saying "fiiiiiniiiiiished!". What's useful about it is that we can attach the interrupt to a function or subroutine so that it automatically runs the code whenever the timer interrupt is fired.

It's this interrupt system we use to ensure that our multiplexed display runs at the right rate. We first set the prescaled delay to 8ms, which means it fires off at a rate of 125Hz to get the multiplex rate above eye speed.

ERROR CODES

Our sketch has four error codes that relate to the DHT11:

- E0 – all good
- E1 – data read error
- E2 – data read timeout
- E3 – initialisation fault

If you get 'E3', it'll likely mean the DHT11 isn't getting any volts or there's no data connection, so check your wiring. 'E2' will occur if you swap the DHT initialisation code around in our sketch file and we've never seen 'E1'.

The 'E0' error code means zero errors – all's well.

DRIVING THE LEDS

The next question is: what data are we sending to those displays? At the front of the code is a long-winded two-dimensional integer array, where each row represents a numerical digit from 0 to 9, followed by various characters we want to display; for example, the degrees symbol, percentage, letters and the like.

Each row contains seven numbers that correspond to each of the seven segments in the display: a 1 means we want a particular LED to light up, while a 0 means we don't. So the way it works is if we want a 5 to appear on DIGIT1, we retrieve the data from row 6 of the array (arrays start at zero) and switch D9 high, which flicks the transistor switch. We then send the data to outputs D2 to D8 and the display will light up for 8ms before switching off again. It sounds slow to read it, but in action, you can't see it.

The data for each display digit is stored in two integer variables: 'digit1' and 'digit2'. Because the displays are automatically updated every 8ms, all we need to do is throw the right digit into those two variables

and within 16ms (8ms for each digit), the numbers will appear on those displays. Wherever you see a 'digit1 = 10' or 'digit2 = 13' line in our sketch, that's exactly what we're doing.

However, since we get the temperature and humidity readings as two-digit integer values from the 'dht11.temperature' and 'dht11.humidity' functions, manually setting 'digit1' and 'digit2' is clumsy. So to simplify things, we've added the 'shownumber' function. It takes the data values direct from the 'dht11' functions and uses some simple maths functions to separate the digits and updates the 'digit1' and 'digit2' variables.

HOW THE WEATHER STATION WORKS

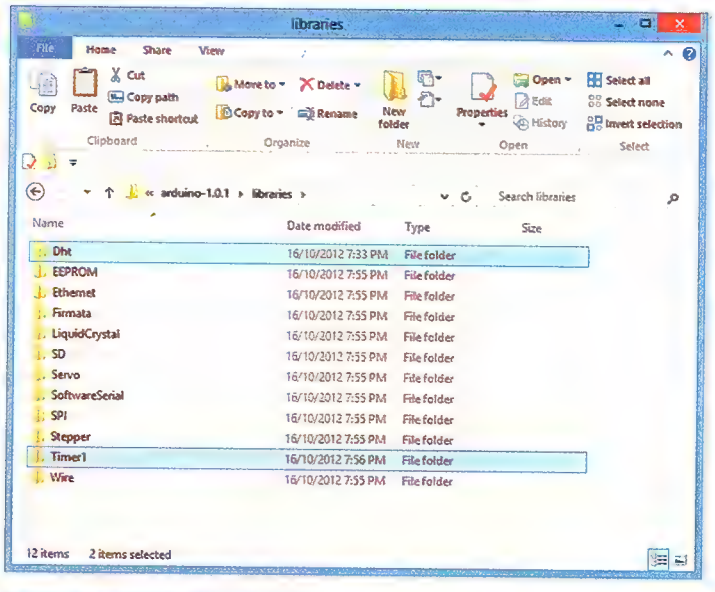
When the Arduino first powers up, it'll show my initials (it's your job to figure out how to add your own), followed by the startup error code. If it's all good, you should get 'E0'. After that, it'll blank momentarily and then begin with the temperature, followed by '°C'. The display will go blank, then show the humidity followed by '%' and then go blank again. Each 'step' lasts for one second and continues this loop until the power is removed.

PLAYING WITH THE CODE

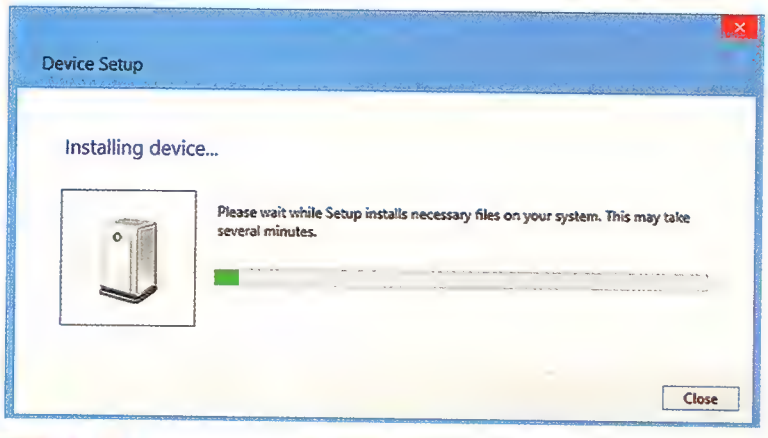
Provided you don't change any of the output pin assignments at the top of the sketch code file, feel free to muck around with the code and change things. One thing we'd recommend changing is the value in the 'timer1.initialize(8000)' line. This is the line where we set the 8ms/125Hz time delay. Change it to '500000' and see what happens (we won't spoil it by telling you now, but hopefully you'll already have an idea).We've tossed in lots of comments into the code to help you understand what's going on.

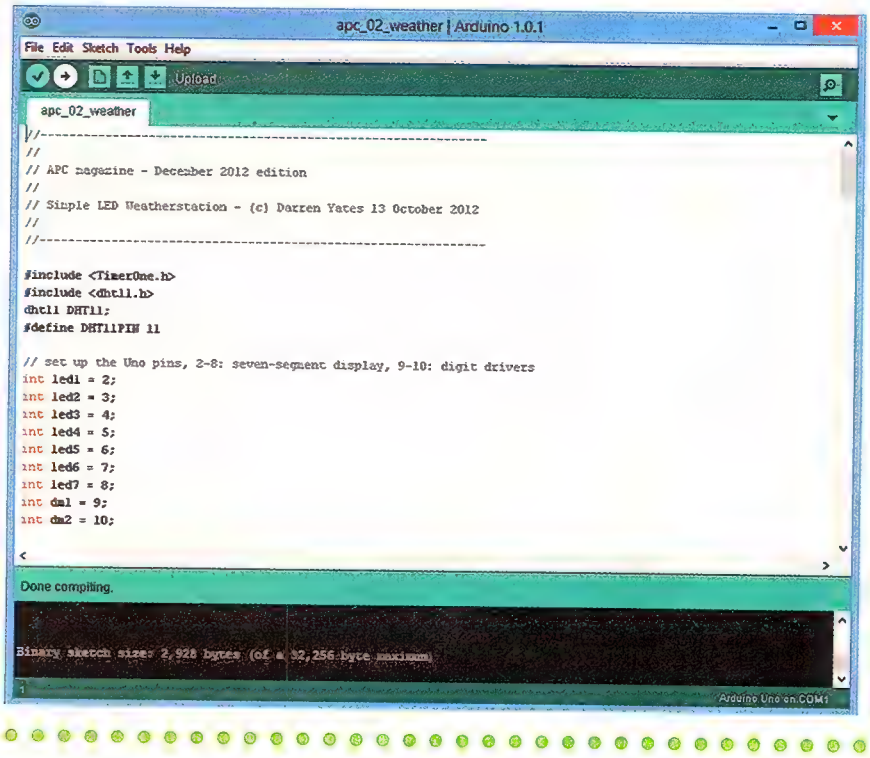
So why not give it a shot? Using computers is cool. Building your own computerised gadgets is better.

INSTALLING THE SOFTWARE INTO THE ARDUINO UNO


libraries
File Home Share View
Copy Paste Cut Copy path Paste shortcut
Move to Copy to Delete Rename New folder
Properties Open Edit History
Select all Select none Invert selection
Clipboard Organize New Open Select
arduino-1.0.1 ▸ libraries ▸
Search libraries
Name Date modified Type Size
Dht 16/10/2012 7:33 PM File folder
EEPROM 16/10/2012 7:55 PM File folder
Ethernet 16/10/2012 7:55 PM File folder
Firmata 16/10/2012 7:55 PM File folder
LiquidCrystal 16/10/2012 7:55 PM File folder
SD 16/10/2012 7:55 PM File folder
Servo 16/10/2012 7:55 PM File folder
SoftwareSerial 16/10/2012 7:55 PM File folder
SPI 16/10/2012 7:55 PM File folder
Stepper 16/10/2012 7:55 PM File folder
Timer1 16/10/2012 7:56 PM File folder
Wire 16/10/2012 7:55 PM File folder
12 items 2 items selected

01 If you haven't already, download the Arduino 1.0.1 IDE from the Arduino web site (**arduino.cc**). Unzip it into a folder on your computer. Next, grab our 'weatherstation.zip' file from **apcmag.com/arduino.htm**. Unzip the file and copy the 'DHT' and 'Timer1' folders into the IDE's \Arduino-1.0.1\libraries\ subfolder.


Device Setup
Installing device...
Please wait while Setup installs necessary files on your system. This may take several minutes.
Close


apc_02_weather | Arduino 1.0.1
File Edit Sketch Tools Help
Upload
apc_02_weather
//---
// APC magazine - December 2012 edition
// Simple LED Weatherstation - (c) Darren Yates 13 October 2012
//---
#include <TimerOne.h>
#include <dht11.h>
dht11 DHT11;
#define DHT11PIN 11
// set up the Uno pins, 2-8: seven-segment display, 9-10: digit drivers
int led1 = 2;
int led2 = 3;
int led3 = 4;
int led4 = 5;
int led5 = 6;
int led6 = 7;
int led7 = 8;
int dm1 = 9;
int dm2 = 10;
Done compiling.
Binary sketch size: 2,928 bytes (of a 32,256 byte maximum)
Arduino Uno on COM1

02 Plug your Arduino into a spare USB port. If Windows asks for driver software, the Freetronics driver .INF file is available at **tinyurl.com/7cedl5o** and check the \Arduino-1.0.1\drivers\ folder for Arduino or compatible boards. Take note of the COM port assigned to your Arduino. Launch the 'Arduino.exe' file to start the IDE (64-bit Windows 8 users will have issues with driver installation – check the Arduino web site for updated drivers).

03 Load up the 'apc_02_weather.ino' file into the IDE. Click the green tick ('Verify' button) to check that there are no compile errors. Next, click the 'Upload' button and it should start installing into your board (your Arduino's LED should flicker). When it's complete, it will automatically start running our code.

apc

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After three weeks of almost religious use during gaming, movie time and breakfast, the only noticeable benefits are the increased contrast, desirability to the ladies and an overinflated sense of health given my jaundiced view of the world.

Realistically, we could only recommend these to regular FPS players who *may* find some benefit from the additional contrast. For everyone else you'd get the same result from wrapping cellophane around your face.

Troy Coleman

Dishonored

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Arcane Studios is a developer with a scorching case of hero worship. The joint French-American studio's two leads have both been involved in game design since the early '90s and both idolise the games of one company in particular: Looking Glass Studios (LGS). LGS created some of the most fantastically immersive and deep games (in characters, story and gameplay) ever made – ones that were well beyond their time. The studio's *System Shock* and *Thief* series have strongly influenced modern game designers, and helped spawn hits such as the *BioShock* and *Deus Ex* series (including last year's excellent *Deus Ex: Human Revolution*).

Dishonored is Arcane's fourth major game and it's perhaps one of the most reverential examples of LGS love you'll ever play. Its sneak-centric, first-person gameplay and steampunk world undeniably contain a shedload of *Thief*'s DNA. Thankfully, the devs haven't just tried to clone their heroes' work – on top of that *Thief* blueprint are new gameplay elements that make *Dishonored* a much faster-paced experience. The game sees you playing royal bodyguard-turned-assassin Corvo Attano, and takes place in a pseudo-19th century city called Dunwall. Dunwall's a lot like London, except with more advanced steampunk technology and secretive elements of dark magic. For Corvo, that includes a range of gadgets and magic abilities you get to use – things like seeing enemies through walls, slowing down time and even short-range teleportation, which lets you flash in behind an enemy, knock him out (or kill him, if you so choose), sling his body over your shoulder and then flash black into the shadows again – hopefully all before his comrades have even noticed. It's incredibly empowering and fun to use, and adds a great action element to all that sneaking around in the shadows.

Dishonored's story, characters and gameplay are all deftly woven together, and Corvo's exploits take you from sewers to rooftops and costume balls to abandoned ruins. It makes for a compelling and memorable experience. It's one that old school *Thief* fans will absolutely adore, but really, it's so well made that everyone should get in on this love fest. A strong contender for Game of the Year.

Dan Gardiner

✔ Fantastic characters and story, meshes old with new almost seamlessly.
✖ Some fiddly control elements.

9/10

Torchlight II

Point, click and kill, kill, kill.

PC

@ www.torchlight2game.com $ US$19.99

While *Diablo III's* grabbed many a dungeon romping, click-happy gamer's time of late, *Torchlight II* offers much of the same experience for a fraction of the price. That shouldn't be a huge shock, as much of the design team behind the *Torchlight* series was also involved in the first two *Diablo* titles.

If there's something that the game excels in, beyond clicking to kill thousands of enemies, it's in showering you – sometimes literally – in hefty quantities of loot. Your pet has been upgraded; not only will it sell your excess loot for you, it'll also pick up extra health and magic potions. You might not need them, since on everything but the highest difficulty levels *Torchlight II* isn't that tricky.

The game is also not that strong in the storyline department, which essentially boils down to 'beat up the bad guys and steal all their loot'. To be honest, though, you probably won't notice that because what *Torchlight II* undeniably does is give you lots of fun, whether you choose to play solo or co-operatively.

At the asking price, while it's not particularly original, it's undeniably a bargain that you can sink many happy hours of gaming time into.

Alex Kidman

✓ Lots of lovely loot to pillage, plenty of character variety.

✗ Too easy, weak story.

8/10

WOW: MISTS OF PANDARIA

8/10

Prepare to dive back into the endless abyss that sucks away all your spare time.

@ www.blizzard.com
$ US$49.95

PC

World of Warcraft is one of the few titles to open up the wonders of video games to a wider audience – surely 10 million people globally can't be wrong.

The fourth major update to the franchise brings with it breathtaking new zones, a new playable race with its unique kung fu Monk class, *Pokémon*-style mini games and of course, all the phat lootz a min/maxer could dream of. The questing hasn't moved beyond the traditional – and somewhat tiresome – MMO style, but with a much-needed depth and maturity injection.

The story takes place on a hidden new continent where giant kung fu pandas dominate the land. As you immerse deeper into the quest line, you find a much bigger story, which is compelling enough to keep questing after reaching the level cap.

In short, *Mists of Pandaria* is soul-destroyingly addictive. Prepare to watch friends disappear from your social circle for another few months.

Daniel Cheng

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10/10

HOTLINE MIAMI

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✔ Violent, compelling.
✖ Violent.

PC

There's an interview somewhere in which Nicolas Winding Refn and Ryan Gosling talk about the conception of *Drive*, a movie about an arguably heroic sociopathic monster.

Apparently, the seed idea was of a man driving at night crying to new romantic songs on his car stereo – his only connection to humanity.

Hotline Miami springs from a similarly threadbare visual. There's a scene in *Drive* – a major influence here – where Ryan Gosling's monstrous protagonist stands outside a party, looking in at the oblivious participants. *Hotline*'s premise is to ask: what if he'd gone inside?

You can probably guess what follows, though perhaps not the format (or brutality) of the ensuing violence (*Hotline* is a top-down arcade brawler). But the real surprise is how compelling it is. The game's sleeve-worn influences (*Drive*, the early GTA games, and SNES brutality simulator *Smash TV*) cohere into an admittedly sparse, but narratively adroit and mechanically intense murder-fest.

Dom Krupinksi

FIFA 13

The rollercoaster *FIFA* franchise has hauled itself to a peak.

PS3

@ www.ea.com/au/football $ $109.95

Picking up the controls, the first thing that slaps you in the face is how different *FIFA 13* feels. The agility and flexibility is palpable. The improved fluidity of the controls can be attributed to the new 'Complete Control' features, providing a wider set of skills and techniques. Off-the-ball response time has improved, with 80% of team players quick to reply. The other 20% are slower – or in an unexpected position – because of the human error element added to the AI.

Another element that's increased the game's unpredictability is 'First Touch Control'. It's harder for the player to trap the ball when many variables such as weather, player intimidation, ball speed, players' stats and physicality come into play with the push-pull mechanics. Career mode for managers and players now includes international tournaments and clubs. This mode is aimed at diehard players.

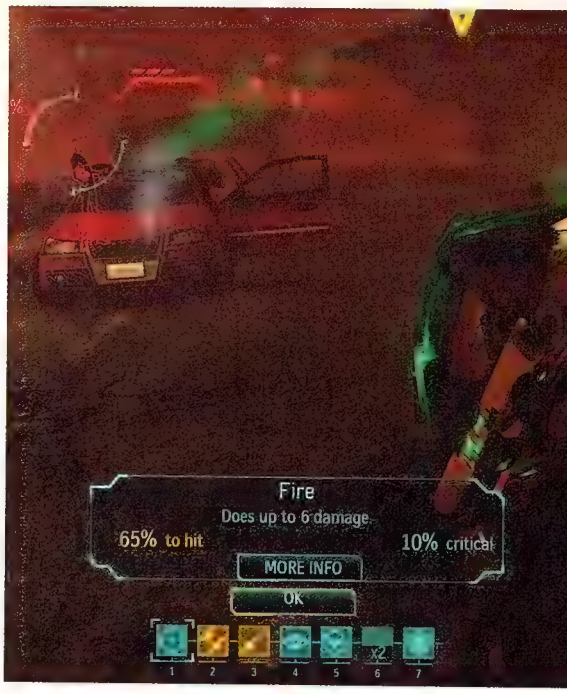
Then there's 'Match Day'. EA has teams from across the globe feeding it football news, which is reflected in players' stats, performances and commentary. And even seasoned *FIFA* players will learn new techniques and hone their skills in the skill games.

For those with an Xbox 360 Kinect and PS3, there are customisable voice-only Kinect controls and Move support. For those who wouldn't normally enjoy sports or feel 'meh' about football will be pleasantly surprised. Even when you get your butt kicked the game manages to be fun, no matter the score disparity. It's made to win *FIFA* fans' hearts back.

Jenna Pitcher

✔ New player push-pull mechanics, improved fluidity of controls.
✖ Menu system is unintuitive, career mode can be daunting.

9/10



XCOM: Enemy Unknown

If you've played the original, that'd be Enemy Familiar...

PC

@ www.xcom.com $ $69.95

A genuine remake of 1994 strategy classic *UFO: Enemy Unknown*, this title successfully weaves together the threads that made the original great, ditches the ones that didn't work, and is updated and accessible enough that even newcomers can enjoy it.

As before, its overarching gameplay tasks you with repelling an alien invasion of Earth and it's a game of two very different halves. The first is managing the XCOM base – launching satellites, choosing what alien tech to research, expanding the base facilities and choosing where to spend money. The other half is where the real action takes place – boots on the ground turn-based combat, with your squad of soldiers running up against a variety of aliens, from the stereotypical bug-eyed Greys to hulking 8-foot tall behemoths.

Running on the Unreal Engine, there's a pleasing variety of objectives and environments to the combat missions, from warehouses to suburban streets, woodlands, deserts and alien craft. And it requires genuine strategy to come out with your squad alive – you've got to stick to cover, not let your guys get too bunched up, flank, take the high ground and make use of their varying abilities to scrape by. Equipping your soldiers with the latest alien tech-enhanced gear is also essential... and a bit of luck doesn't hurt.

Developer Firaxis has more than lived up to its *Civilization credentials* with *XCOM*; despite a few control issues, it's created a strategy title that's easy to pick up yet challenging, epic but not overwhelming.

Dan Gardiner

✔ Lovingly remakes the original while updating the pacing and graphics.
✖ A few minor control problems, rigid prerequisites to end a game.

9/10

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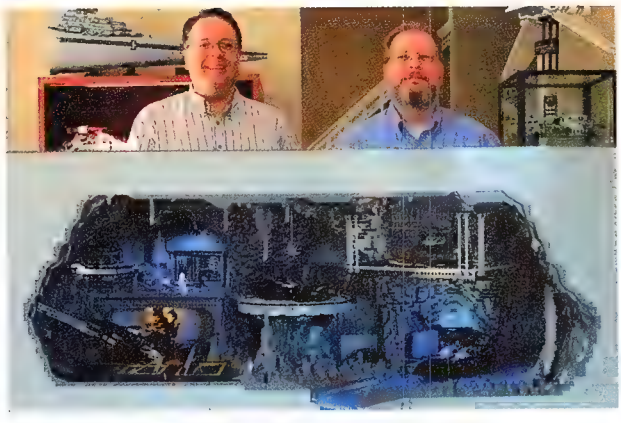
SIMON CHESTER

IF YOU'RE NERDY AND YOU KNOW IT, MAP YOUR LAN.

DEAD STARS MAY HELP IN SPACECRAFT NAVIGATION

There are myriad obstacles in our path before humankind ever reaches that lofty goal of long-distance space travel. One of those obstacles is, of course, navigation – made ever more complicated by that pesky third dimension. Scientists at the National Physical Laboratory (NPL) and the University of Leicester have been commissioned by the European Space Agency to investigate the feasibility of using the X-ray pulses emitted by pulsars – dead stars – as deep space navigation beacons, helping unmanned spacecraft eliminate their reliance on ground stations back on Earth.

Pulsars are highly compact and rapidly rotating neutron stars that emit intense electromagnetic radiation observed as pulses, similar to the rotating beam of light seen from a lighthouse. In some cases, these pulses can be highly regular, making them suitable sources for navigation using a technique similar to GPS. If this technique proves feasible and craft become capable of navigating themselves, it may well open up the possibility of inter-stellar crafts carrying snap-frozen human cargo, primed for later defrosting and subsequent inter-galactic repopulation.

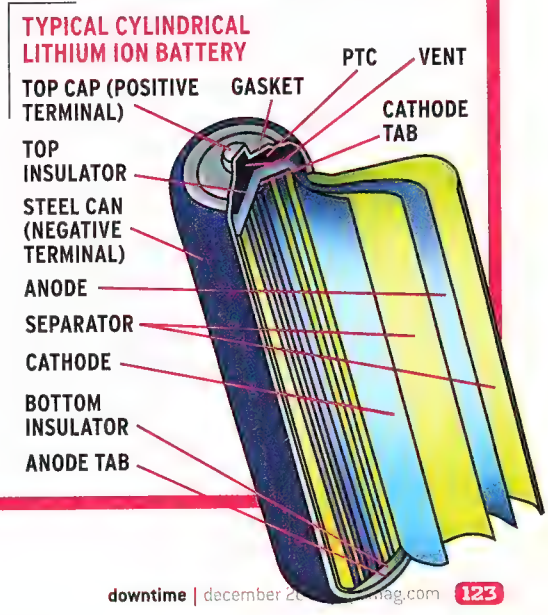


LEGO BATCAVE BLOWS BATMINDS

I know I feature a lot of LEGO creations in this column, but I love it when a nerdy pastime imitates a nerdy pastime – it's like two funs for the price of one. Over time, I've seen some pretty impressive creations made from little plastic bricks. But this Batcave recreation, created by Wayne Hussey and Carlyle Livingston II, takes the batcake and then smashes it with a batarang. The Batcave was first displayed at Emerald City ComiCon in late March of 2012 and then made an appearance at Jet City Comic Show and BrickCon 2012. The pair spent 400 hours each over three months building the 45kg piece and estimate that it contains over 20,000 pieces. Final touches include a battery-powered Batmobile lazy Susan, Batplane launcher and Batarmoury. For more images and some videos of the mechanical bits in action, visit the Flickr Set at **tinyurl.com/9hngocg**.

ALGORITHMS TO HELP BATTERIES CHARGE TWICE AS FAST

Batteries are the weakest link in the digital age, with developments in charge-holding technology coming at a relative snail's pace when compared to those involving silicon. So, any improvement to the technology is always welcome, especially one that doesn't involve new manufacturing techniques. Engineers at the University of California, San Diego, have developed some estimation algorithms that allow lithium ion batteries to run more efficiently, potentially reducing their cost by 25% (as you won't need as much lithium in your battery to get just as much juice) and potentially allowing the batteries to charge twice as fast as is currently possible. The estimation algorithms don't look at voltage and current to gauge current levels of charge, but instead estimate where ions lay within the battery. This way, the charger can more efficiently direct the charged particles to where there's room for them, as well as better monitor the battery's health. The algorithms are being developed with the initial aim of them being used for electric vehicle batteries. In time, these should likely trickle down to our beloved, under-powered smartphones. ADC



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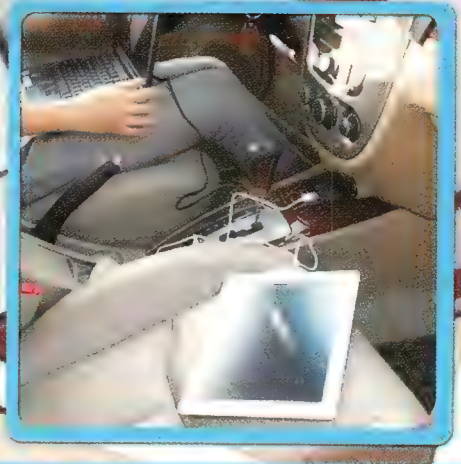
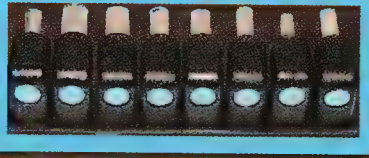


8 TIPS



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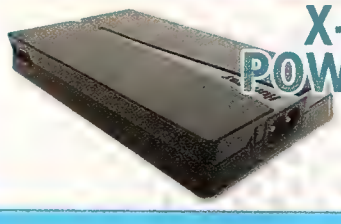

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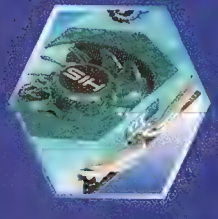

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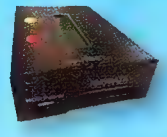

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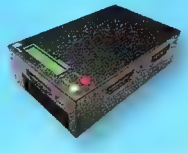

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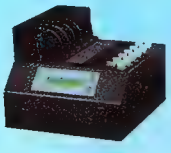

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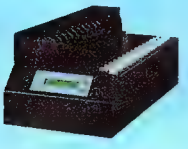

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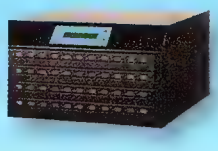

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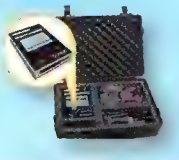

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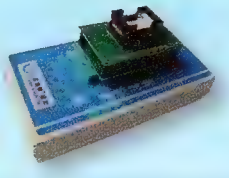

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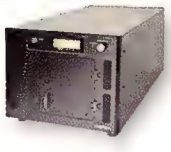

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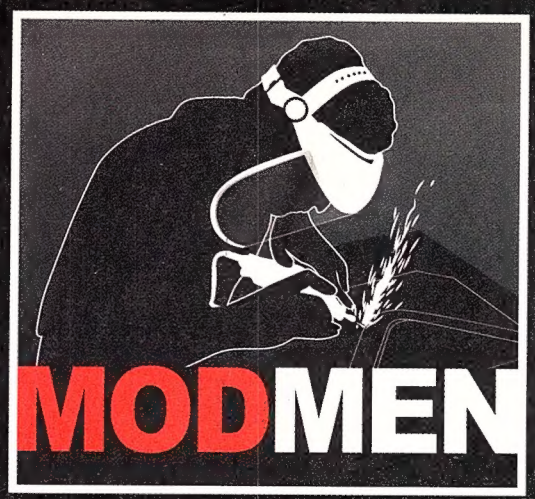

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